```
   ********** ANSYS OUTPUT DATA LISTING **********

  *** ANSYS REV 4.4           38122-PC/LIN-4.4 CP=    7.410 ****
  FOR SUPPORT CALL ROBERT QUINN      PHONE (408) 281-6151    TWX

NEW TITLE= SUPPORT ROD STRESS PASS

        ***** GENERAL GRAPH POSTPROCESSOR (POST26) *****

ENTER  /SHOW.DEVICE-NAME  TO ENABLE GRAPHIC DISPLAY
ENTER  FINISH             TO LEAVE POST26

ALL POST26 SPECIFICATIONS ARE RESET TO INITIAL DEFAULTS

MINIMUM TIME= 0.00000E+00   MAXIMUM TIME= 0.13700E-01

*** NOTE ***
REDEFINITION OF TIME RANGE ERASES ALL PREVIOUSLY STORED OR CALCULATED DATA

VARIABLE  2  IS ELEMENT   629  ITEM  26  NAME= 629  SII

VARIABLE  3  IS ELEMENT   630  ITEM  26  NAME= 630  SII

VARIABLE  4  IS ELEMENT   631  ITEM  26  NAME= 631  SII

VARIABLE  5  IS ELEMENT   632  ITEM  26  NAME= 632  SII

VARIABLE  6  IS ELEMENT   633  ITEM  26  NAME= 633  SII

VARIABLE  7  IS ELEMENT   628  ITEM  30  NAME= 628  SIJ

LABY GRAPH PLOT LABEL = SI

NEW TITLE= SUPPORT ROD S.I. VS. TIME, ELEM 628
       SUMMARY OF VARIABLES STORED THIS STEP AND EXTREME VALUES
VARI TYPE  IDENTIFIERS  NAME   MINIMUM    AT TIME     MAXIMUM   AT TIME

  2 ESTR   629  26    629 SII    339.1     0.2329E-03 0.3844E+05 0.3203E-02
  3 ESTR   630  26    630 SII    628.0     0.2329E-03 0.5804E+05 0.3436E-02
  4 ESTR   631  26    631 SII    621.8     0.2329E-03 0.5429E+05 0.3436E-02
  5 ESTR   632  26    632 SII    615.5     0.2329E-03 0.5071E+05 0.3639E-02
  6 ESTR   633  26    633 SII    609.3     0.2329E-03 0.4781E+05 0.3872E-02
  7 ESTR   628  30    628 SIJ    261.1     0.2329E-03 0.3992E+05 0.3203E-02


VARIABLE  2  IS ELEMENT   540  ITEM   7  NAME= 540  FX

VARIABLE  3  IS ELEMENT   541  ITEM   1  NAME= 541  FX

STORAGE COMPLETE FOR     59 DATA POINTS

       SUMMARY OF VARIABLES STORED THIS STEP AND EXTREME VALUES
VARI TYPE  IDENTIFIERS  NAME   MINIMUM    AT TIME     MAXIMUM   AT TIME

  2 ESTR   540  7     540 FX   -0.1374E+05 0.3436E-02  304.8     0.1348E-01
  3 ESTR   541  1     541 FX    -8525.     0.7774E-02 0.4997E+05 0.3436E-02

VARIABLE   4 IS  1.0000     TIMES VARIABLE   2 PLUS  1.0000     TIMES VARIABLE   3
           PLUS  1.0000     TIMES VARIABLE   0

NEW TITLE= SUPPORT ROD/SPACER DISK #2 WELD SHEAR - NODE 143
        POST26 SUMMARY OF VARIABLE EXTREME VALUES
VARI TYPE  IDENTIFIERS  NAME   MINIMUM    AT TIME     MAXIMUM   AT TIME

  4 OPER     4  ADD   FX       -0.1020E+05 0.8444E-02 0.3811E+05 0.4105E-02

VARIABLE  2  IS ELEMENT   540  ITEM  11  NAME= 540  MY

VARIABLE  3  IS ELEMENT   541  ITEM   5  NAME= 541  MY

VARIABLE  4  IS ELEMENT   540  ITEM  12  NAME= 540  MZ

VARIABLE  5  IS ELEMENT   541  ITEM   6  NAME= 541  MZ

STORAGE COMPLETE FOR     59 DATA POINTS
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       SUMMARY OF VARIABLES STORED THIS STEP AND EXTREME VALUES
VARI TYPE  IDENTIFIERS  NAME   MINIMUM    AT TIME     MAXIMUM   AT TIME

  2 ESTR   540  11    540 MY   -0.4719E+05 0.4105E-02 0.1898E+05 0.8677E-02
  3 ESTR   541  5     541 MY   -0.5681E+05 0.4105E-02 0.2098E+05 0.7774E-02
  4 ESTR   540  12    540 MZ   -0.6175E+05 0.4105E-02 0.2495E+05 0.8444E-02
  5 ESTR   541  6     541 MZ   -0.6934E+05 0.4105E-02 0.2935E+05 0.7978E-02

VARIABLE   6 IS  1.0000     TIMES VARIABLE   2 PLUS  1.0000     TIMES VARIABLE   3
           PLUS  1.0000     TIMES VARIABLE   0

VARIABLE   7 IS  1.0000     TIMES VARIABLE   4 PLUS  1.0000     TIMES VARIABLE   5
           PLUS  1.0000     TIMES VARIABLE   0

NEW TITLE= SUPPORT ROD/SPACER DISK #2 WELD SHEAR - NODE 143
         POST26 SUMMARY OF VARIABLE EXTREME VALUES
VARI TYPE  IDENTIFIERS  NAME   MINIMUM    AT TIME     MAXIMUM   AT TIME

  6 OPER     6  ADD   MY       -0.1040E+06 0.4105E-02 0.3646E+05 0.8677E-02
  7 OPER     7  ADD   MZ       -0.1311E+06 0.4105E-02 0.5291E+05 0.8211E-02

VARIABLE  2  IS ELEMENT   617  ITEM   7  NAME= 617  FX

VARIABLE  3  IS ELEMENT   618  ITEM   1  NAME= 618  FX

STORAGE COMPLETE FOR     59 DATA POINTS

       SUMMARY OF VARIABLES STORED THIS STEP AND EXTREME VALUES
VARI TYPE  IDENTIFIERS  NAME   MINIMUM    AT TIME     MAXIMUM   AT TIME

  2 ESTR   617  7     617 FX   -0.1346E+06 0.3872E-02 -873.7     0.2329E-03
  3 ESTR   618  1     618 FX     2270.     0.2329E-03 0.1595E+06 0.3872E-02

VARIABLE   4 IS  1.0000     TIMES VARIABLE   2 PLUS  1.0000     TIMES VARIABLE   3
           PLUS  1.0000     TIMES VARIABLE   0

NEW TITLE= SUPPORT ROD/SPACER DISK #9 WELD SHEAR - NODE 843
         POST26 SUMMARY OF VARIABLE EXTREME VALUES
VARI TYPE  IDENTIFIERS  NAME   MINIMUM    AT TIME     MAXIMUM   AT TIME

  4 OPER     4  ADD   FX        -4103.     0.1188E-01 0.2933E+05 0.3203E-02

VARIABLE  2  IS ELEMENT   617  ITEM  11  NAME= 617  MY

VARIABLE  3  IS ELEMENT   618  ITEM   5  NAME= 618  MY

VARIABLE  4  IS ELEMENT   617  ITEM  12  NAME= 617  MZ

VARIABLE  5  IS ELEMENT   618  ITEM   6  NAME= 618  MZ

STORAGE COMPLETE FOR     59 DATA POINTS

       SUMMARY OF VARIABLES STORED THIS STEP AND EXTREME VALUES
VARI TYPE  IDENTIFIERS  NAME   MINIMUM    AT TIME     MAXIMUM   AT TIME

  2 ESTR   617  11    617 MY    -6860.     0.1188E-01 0.3746E+05 0.2737E-02
  3 ESTR   618  5     618 MY   -0.1304E+05 0.1188E-01 0.4698E+05 0.2970E-02
  4 ESTR   617  12    617 MZ    -8796.     0.1211E-01 0.4794E+05 0.2737E-02
  5 ESTR   618  6     618 MZ   -0.1732E+05 0.1211E-01 0.5617E+05 0.2970E-02

VARIABLE   6 IS  1.0000     TIMES VARIABLE   2 PLUS  1.0000     TIMES VARIABLE   3
           PLUS  1.0000     TIMES VARIABLE   0

VARIABLE   7 IS  1.0000     TIMES VARIABLE   4 PLUS  1.0000     TIMES VARIABLE   5
           PLUS  1.0000     TIMES VARIABLE   0

NEW TITLE= SUPPORT ROD/SPACER DISK #9 WELD MOMENTS - NODE 843
         POST26 SUMMARY OF VARIABLE EXTREME VALUES
VARI TYPE  IDENTIFIERS  NAME   MINIMUM    AT TIME     MAXIMUM   AT TIME

  6 OPER     6  ADD   MY       -0.1990E+05 0.1188E-01 0.8431E+05 0.2737E-02
  7 OPER     7  ADD   MZ       -0.2611E+05 0.1211E-01 0.1040E+06 0.2737E-02

VARIABLE  2  IS ELEMENT   628  ITEM   7  NAME= 628  FX
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```
VARIABLE  3  IS ELEMENT   629  ITEM   1  NAME= 629  FX

STORAGE COMPLETE FOR     59 DATA POINTS

       SUMMARY OF VARIABLES STORED THIS STEP AND EXTREME VALUES
VARI TYPE  IDENTIFIERS  NAME   MINIMUM    AT TIME     MAXIMUM   AT TIME

  2 ESTR   628  7     628 FX   -0.1470E+06 0.3872E-02 -1643.     0.2329E-03
  3 ESTR   629  1     629 FX     2246.     0.2329E-03 0.1637E+06 0.4105E-02

VARIABLE   4 IS  1.0000     TIMES VARIABLE   2 PLUS  1.0000     TIMES VARIABLE   3
           PLUS  1.0000     TIMES VARIABLE   0

NEW TITLE= SUPPORT ROD/TOP PLATE WELD SHEAR - NODE 943
         POST26 SUMMARY OF VARIABLE EXTREME VALUES
VARI TYPE  IDENTIFIERS  NAME   MINIMUM    AT TIME     MAXIMUM   AT TIME

  4 OPER     4  ADD   FX        -7850.     0.1301E-01 0.2315E+05 0.1834E-02

VARIABLE  2  IS ELEMENT   628  ITEM  11  NAME= 628  MY

VARIABLE  3  IS ELEMENT   629  ITEM   5  NAME= 629  MY

VARIABLE  4  IS ELEMENT   628  ITEM  12  NAME= 628  MZ

VARIABLE  5  IS ELEMENT   629  ITEM   6  NAME= 629  MZ

STORAGE COMPLETE FOR     59 DATA POINTS

       SUMMARY OF VARIABLES STORED THIS STEP AND EXTREME VALUES
VARI TYPE  IDENTIFIERS  NAME   MINIMUM    AT TIME     MAXIMUM   AT TIME

  2 ESTR   628  11    628 MY   -0.1109E+05 0.1165E-01 0.4274E+05 0.2970E-02
  3 ESTR   629  5     629 MY    -9699.     0.1141E-01 0.3580E+05 0.3203E-02
  4 ESTR   628  12    628 MZ   -0.1140E+05 0.1165E-01 0.3206E+05 0.2970E-02
  5 ESTR   629  6     629 MZ   -0.1006E+05 0.1165E-01 0.2787E+05 0.3203E-02

VARIABLE   6 IS  1.0000     TIMES VARIABLE   2 PLUS  1.0000     TIMES VARIABLE   3
           PLUS  1.0000     TIMES VARIABLE   0

VARIABLE   7 IS  1.0000     TIMES VARIABLE   4 PLUS  1.0000     TIMES VARIABLE   5
           PLUS  1.0000     TIMES VARIABLE   0

NEW TITLE= SUPPORT ROD/TOP PLATE WELD MOMENTS - NODE 943
         POST26 SUMMARY OF VARIABLE EXTREME VALUES
VARI TYPE  IDENTIFIERS  NAME   MINIMUM    AT TIME     MAXIMUM   AT TIME

  6 OPER     6  ADD   MY        -0.2038E+05 0.1165E-01 0.7845E+05 0.3203E-02
  7 OPER     7  ADD   MZ        -0.2147E+05 0.1165E-01 0.5980E+05 0.2970E-02
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
/PREP7
/TITLE,1 1/4" TOP PLATE END DROP ANALYSIS
C*** SPACER DISK ELEMENTS ***
ET,1,63
C*** D.U. SHIELD BLOCK ELEMENTS ***
ET,2,4
C*** POISON SHEET ELEMENTS
ET,3,4
C*** D.U. MASS ELEMENTS ***
ET,4,21
KAN,2
KAY,3,1
TREF,500
TUNIF,500
DENS,1,0.00073
NUXY,1,0.29
EX,1,26.2E6
DENS,2,0.00769
NUXY,2,0.29
EX,2,27.0E6
DENS,3,0.00650
NUXY,3,0.29
EX,3,27.0E6
DENS,4,0.00879
NUXY,4,0.29
EX,4,27.0E6
DENS,5,0.00775
NUXY,5,0.29
EX,5,27.0E6
DENS,6,0.00073
NUXY,6,0.29
EX,6,27.0E6
C*** REAL CONSTANTS
C*** D.U. SHIELD BLOCK CASING BEAM PROPERTIES ***
C*** AREA,IZZ,IYY,TKZ,TKY ***
R,1,8.475,0.323,24.99,7.5,1.13
C*** TOP PLATE THICKNESS ***
R,2,1.25
C*** POISON SHEET BEAM PROPERTIES ***
C*** AREA,IZZ,IYY,TKZ,TKY ***
R,8,1.875,0.00977,16.523,7.5,0.25
C*** NODE GENERATION
CSYS,1
N,1,18.655,-90
N,31,18.655,0
FILL
NGEN,2,31,1,31,1,,-0.49
NDELE,39
CSYS,0
N,63,0.,-17
N,64,0.4,-17
N,70,6.4,-17
FILL
N,71,0.,-16
N,72,.4,-16
N,73,6.4,-16
N,74,7.2,-16
NGEN,2,5,71,74,1,,1.0
N,80,8.2,-15
N,81,9.2,-15
NGEN,2,6,76,81,1,,1.0
N,88,10.2,-14
NGEN,2,7,82,88,1,,1.0
N,96,11.2,-13
N,97,12.2,-13
NGEN,2,9,89,97,1,,1.0
N,107,13.2,-12
N,108,0,-11
N,109,.4,-11
N,115,6.4,-11
FILL
N,116,7.2,-11
N,122,13.2,-11
```

```
FILL
NGEN,2,15,108,115,1,,,375
N,131,6,8,,-10.625
NGEN,2,9,123,131,1,,,375
N,141,7,2,,-10.25
N,147,13,2,,-10.25
FILL
N,148,13,6,,-10.25
N,149,14,6,,-10.25
N,150,0,,-9.25
N,151,,4,,-9.25
N,152,6,4,,-9.25
N,153,6,8,,-9.25
N,154,7,2,,-9.25
N,155,13,2,,-9.25
N,156,13,6,,-9.25
N,157,14,6,,-9.25
NGEN,2,8,150,157,1,,,1,0
N,166,15,6,,-8.25
NGEN,2,9,158,166,1,,,1,0
NGEN,2,9,167,175,1,,,1,0
N,185,16,6,,-6.25
NGEN,2,10,176,185,1,,,1,0
NGEN,2,64,132,148,1,,,6,0
N,215,16,6,,-4.25
FILL,212,215
N,216,0,,-3.625
N,219,3,,-3.625
FILL
N,220,3,8,,-3.625
N,226,9,8,,-3.625
FILL
N,227,10,6,,-3.625
N,233,16,6,,-3.625
FILL
NGEN,2,18,216,219,1,,,0.625
N,238,3,4,,-3.0
N,239,3,8,,-3.0
N,245,9,8,,-3.0
FILL
N,246,10,2,,-3.0
N,247,10,6,,-3.0
N,253,16,6,,-3.0
FILL
NGEN,2,17,237,239,1,,,1,0
NGEN,2,12,245,247,1,,,1,0
N,260,16,6,,-2
NGEN,3,7,254,260,1,,,1,0
C*** ELEMENT GENERATION
REAL,2
E,1,2,33,32
EGEN,6,1,-1
E,7,8,70,38
E,8,9,40,70
E,9,10,41,40
EGEN,22,1,-1
E,32,64,63
E,32,33,64
E,33,34,65,64
EGEN,5,1,-1
E,38,70,69
E,63,64,72,71
E,70,40,74,73
E,40,41,74
E,71,72,77,76
E,73,74,79,78
E,74,41,80,79
E,41,42,81,80
E,42,43,81
E,76,77,83,82
E,78,79,85,84
E,79,80,86,85
E,80,81,87,86
E,81,43,44
E,81,44,88
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E.81.88.87
E.82.83.90.89
E.84.85.92.91
EGEN.4.1.-1
E.88.45.96.95
E.44.45.88
E.45.46.96
E.46.97.96
E.46.47.97
E.89.90.99.98
E.91.92.101.100
EGEN.6.1.-1
E.97.47.106
E.47.107.106
E.47.48.107
E.98.99.109.108
E.100.101.116.115
EGEN.7.1.-1
E.48.49.107
E.107.49.122
E.49.50.122
E.108.109.124.123
EGEN.7.1.-1
E.115.131.130
E.115.116.131
E.123.124.133.132
EGEN.7.1.-1
E.130.131.140.139
E.131.116.141
E.131.141.140
E.116.117.142.141
EGEN.6.1.-1
E.122.148.147
E.122.50.148
E.148.50.149
E.50.51.149
E.132.133.151.150
E.139.140.153.152
E.140.141.154.153
E.147.148.156.155
E.148.149.157.156
E.149.51.157
E.51.52.157
E.150.151.159.158
E.152.153.161.160
E.153.154.162.161
E.155.156.164.163
E.156.157.165.164
E.157.52.166.165
E.52.53.166
E.158.159.168.167
E.160.161.170.169
E.161.162.171.170
E.163.164.173.172
E.164.165.174.173
E.165.166.175.174
E.166.53.54.175
E.167.168.177.176
E.169.170.179.178
E.170.171.180.179
E.172.173.182.181
EGEN.3.1.-1
E.175.54.185.184
E.54.55.185
E.176.177.187.186
E.178.179.189.188
E.179.180.190.189
E.181.182.192.191
EGEN.4.1.-1
E.55.56.185
E.185.56.195
E.186.187.197.196
E.188.189.204.203
E.189.190.205.204
E.191.192.212.211
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EGEN.4.1.-1
E.195.56.57
E.195.57.215
E.215.57.58
E.196.197.216
E.197.198.217.216
EGEN.3.1.-1
E.200.220.219
E.200.201.221.220
EGEN.3.1.-1
E.203.204.223
E.204.205.223
E.205.206.224.223
EGEN.3.1.-1
E.208.227.226
E.208.209.228.227
EGEN.3.1.-1
E.211.212.230
E.212.213.231.230
EGEN.3.1.-1
E.215.58.233
E.216.217.235.234
EGEN.3.1.-1
E.219.238.237
E.219.220.238
E.220.239.238
E.220.221.240.239
EGEN.6.1.-1
E.226.246.245
E.226.227.246
E.227.247.246
E.227.228.248.247
EGEN.6.1.-1
E.233.58.59.253
E.237.238.255.254
E.238.239.256.255
E.245.246.258.257
E.246.247.259.258
E.253.59.60.260
E.254.255.262.261
E.255.256.263.262
E.257.258.265.264
E.258.259.266.265
E.260.60.61.267
E.261.262.269.268
E.262.263.270.269
E.264.265.272.271
E.265.266.273.272
E.267.61.62.274
C*** DU CASING GENERATION
C*** NODES
NSEL.NODE.63.70.1
NASEL.NODE.40.55.1
NASEL.NODE.185
NASEL.NODE.195
NASEL.NODE.215
NASEL.NODE.233
NASEL.NODE.253
NASEL.NODE.260
NASEL.NODE.267
NASEL.NODE.274
NGEN.2.1000.ALL
NALL
C*** ELEMENTS
TYPE.2
REAL.1
MAT.3
E.1063.1064
EGEN.7.1.-1
MAT.4
E.1040.1041
EGEN.3.1.-1
MAT.5
E.1044.1045
EGEN.11.1.-1
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MAT,2
E,1185,1195
E,1195,1215
E,1215,1233
E,1233,1253
E,1253,1260
E,1260,1267
E,1267,1274
C*** POISON SHEET BEAM ELEMENTS
C*** GEOMETRY GENERATION
CSYS,0
NROTAT,ALL
NSEL,NODE,108,122,1
NASEL,NODE,216,232
NASEL,NODE,238
NASEL,NODE,255
NASEL,NODE,262
NASEL,NODE,269
NASEL,NODE,132
NASEL,NODE,150
NASEL,NODE,158
NASEL,NODE,167
NASEL,NODE,176
NASEL,NODE,186
NASEL,NODE,196
NGEN,2,1000,ALL
NALL
TYPE,3
MAT,1
REAL,8
E,1108,1109
EGEN,14,1,-1
E,1216,1217
EGEN,16,1,-1
E,1238,1255
E,1255,1262
E,1262,1269
E,1132,1150
E,1150,1158
E,1158,1167
E,1167,1176
E,1176,1186
E,1186,1196
C*** COUPLED NODES
CSYS,0
NROTAT,ALL
CP,1,UY,216,1216
CPSGEN,17,1,1
CP,18,UY,108,1108
CPSGEN,15,1,18
CP,35,UX,238,1238
CP,36,UZ,63,1063
CP,37,UX,65,1065
CP,38,UY,65,1065
CP,39,UZ,65,1065
CPSGEN,3,2,37
CPSGEN,3,2,38
CPSGEN,3,2,39
CP,46,UX,41,1041
CP,47,UY,41,1041
CP,48,UZ,41,1041
CPSGEN,2,1,46
CPSGEN,2,1,47
CPSGEN,2,1,48
CP,52,UX,45,1045
CP,53,UY,45,1045
CP,54,UZ,45,1045
CPSGEN,5,2,52
CPSGEN,5,2,53
CPSGEN,5,2,54
CPSGEN,2,9,52
CPSGEN,2,9,53
CPSGEN,2,9,54
CP,70,UX,195,1195
CP,71,UX,233,1233
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```
CP.72.UX.260.1260
CP.73.UX.267.1267
CP.74.UY.195.1195
CP.75.UY.233.1233
CP.76.UY.260.1260
CP.77.UY.267.1267
CP.78.UZ.195.1195
CP.79.UZ.233.1233
CP.80.UZ.260.1260
CP.81.UZ.267.1267
CP.82.UX.255.1255
CP.83.UX.262.1262
CP.84.UX.269.1269
CP.85.UZ.238.1238
CP.86.UZ.132.1132
CP.87.UZ.196.1196
CP.88.UZ.232.1232
CP.89.UZ.118.1118
WSORT.X
C*** BOUNDARY CONDITIONS
SYMBC
SYMBC.0.2.0
D.93.UZ.0.0..95.1
D.102.UZ.0.0..104.1
D.117.UZ.0.0..119.1
D.93.UX.0.0..95.1
D.102.UX.0.0..104.1
D.117.UX.0.0..119.1
D.93.UY.0.0..95.1
D.102.UY.0.0..104.1
D.117.UY.0.0..119.1
D.1108.ROTX.0.0..1122.1
D.1216.ROTX.0.0..1232.1
D.1238.ROTY.0.0
D.1255.ROTY.0.0
D.1262.ROTY.0.0
D.1269.ROTY.0.0
D.1132.UY.0.0
D.1064.ROTX.0.0
D.1040.ROTX.0.0
D.1040.ROTY.0.0
D.1045.ROTX.0.0
D.1045.ROTY.0.0
D.1195.ROTX.0.0
D.1195.ROTY.0.0
M.147.UZ
M.216.UZ
M.269.UZ
TOTAL.100
ITER.1.1.1
NLIST.ALL
ELIST.ALL
CPLIST.ALL
MPLIST.ALL
RLIST.ALL
ETLIST.ALL
AFWRITE
FINISH
/INPUT.27
FINISH
/PREP7
RESUME
/TITLE.TOP PLATE TOP END DROP DISPLACEMENT PASS
KAN.5
KAY.3
KAY.8.0
C*** LOADING ***
TIME.0.0
GP.70.1070.FZ.1E8.0.0
GP.40.1040.FZ.1E8.0.0
GP.43.1043.FZ.1E8.0.0
GP.44.1044.FZ.1E8.0.0
GP.65.1065.FZ.1E8.0.0
GP.185.1185.FZ.1E8.0.0
GP.274.1274.FZ.1E8.0.0
```

```
GP.108.1108.FZ.1E8.0.0
GP.109.1109.FZ.1E8.0.0
GP.110.1110.FZ.1E8.0.0
GP.111.1111.FZ.1E8.0.0
GP.112.1112.FZ.1E8.0.0
GP.113.1113.FZ.1E8.0.0
GP.114.1114.FZ.1E8.0.0
GP.115.1115.FZ.1E8.0.0
GP.116.1116.FZ.1E8.0.0
GP.117.1117.FZ.1E8.0.0
GP.119.1119.FZ.1E8.0.0
GP.120.1120.FZ.1E8.0.0
GP.121.1121.FZ.1E8.0.0
GP.122.1122.FZ.1E8.0.0
GP.216.1216.FZ.1E8.0.0
GP.217.1217.FZ.1E8.0.0
GP.218.1218.FZ.1E8.0.0
GP.219.1219.FZ.1E8.0.0
GP.220.1220.FZ.1E8.0.0
GP.221.1221.FZ.1E8.0.0
GP.222.1222.FZ.1E8.0.0
GP.223.1223.FZ.1E8.0.0
GP.224.1224.FZ.1E8.0.0
GP.225.1225.FZ.1E8.0.0
GP.226.1226.FZ.1E8.0.0
GP.227.1227.FZ.1E8.0.0
GP.228.1228.FZ.1E8.0.0
GP.229.1229.FZ.1E8.0.0
GP.230.1230.FZ.1E8.0.0
GP.231.1232.FZ.1E8.0.0
GP.150.1150.FZ.1E8.0.0
GP.158.1158.FZ.1E8.0.0
GP.167.1167.FZ.1E8.0.0
GP.176.1176.FZ.1E8.0.0
GP.186.1186.FZ.1E8.0.0
GP.255.1255.FZ.1E8.0.0
GP.262.1262.FZ.1E8.0.0
GP.269.1269.FZ.1E8.0.0
ACEL...0.0
LWRITE
TIME.0.3E-3
ITER.12..1
ACEL...108192
LWRITE
TIME.0.48E-3
ITER.12..1
ACEL...47914
LWRITE
TIME.7.3E-3
ITER.50..1
ACEL...47914
TIME.13.7E-3
ITER.25..1
ACEL...0
LWRITE
SLOAD.1
AFWRITE
FINISH
/LNFREQ.100
/INPUT.27
FINISH
/TITLE.TOP PLATE TOP END DROP STRESS PASS
/STRESS...5
TIME.13.7E-3
NSTRES.50
END
FINISH
/POST26
ESTR.2.117.72.N147
ESTR.3.40.72.N70
ESTR.4.184.72.N216
ESTR.5.217.87.N269
ESTR.6.59.87.N95
ESTR.7.37.82.N69
ESTR.8.162.72.N196
```

```
/SHOW,SI147
/TITLE,END DROP S.I. (ELEM. 117, NODE 147)
/GRAPH,LABY,PSI
/GRAPH,LABX,SEC.
PLVAR,2
/SHOW,SI70
/TITLE,END DROP S.I. (ELEM. 40, NODE 70)
PLVAR,3
/SHOW,SI216
/TITLE,END DROP S.I. (ELEM. 184, NODE 216)
PLVAR,4
/SHOW,SI269
/TITLE,END DROP S.I. (ELEM. 217, NODE 269)
PLVAR,5
/SHOW,SI95
/TITLE,END DROP S.I. (ELEM. 59, NODE 95)
PLVAR,6
/SHOW,SI69
/TITLE,END DROP S.I. (ELEM. 37, NODE 82)
PLVAR,7
/SHOW,SI196
/TITLE,END DROP S.I. (ELEM. 162, NODE 196)
PLVAR,8
EXTREM,1,8,1
FILE,10
DISP,9,216,UZ,UZ
DISP,10,269,UZ,UZ
DISP,11,196,UZ,UZ
DISP,12,132,UZ,UZ
DISP,13,70,UZ,UZ
DISP,14,147,UZ,UZ
/SHOW,DISP1
/TITLE,TOP PLATE END DROP DISP. VS. TIME (NODES 216 & 269)
/GRAPH,LABY,IN.
PLVAR,9,10
/SHOW,DISP2
/TITLE,TOP PLATE END DROP DISP. VS. TIME (NODES 196 & 132)
/GRAPH,LABY,IN.
PLVAR,11,12
/SHOW,DISP3
/TITLE,TOP PLATE END DROP DISP. VS. TIME (NODES 70 & 147)
/GRAPH,LABY,IN.
PLVAR,13,14
EXTREM,9,14,1
/OUTPUT
/EOF
```

```
   ********** ANSYS OUTPUT DATA LISTING **********

  *** ANSYS REV 4.4           38122-PC/LIN-4.4 CP=   10.550 ****
  FOR SUPPORT CALL ROBERT QUINN      PHONE (408) 281-6151    TWX

NEW TITLE= 1 1/4" TOP PLATE END DROP ANALYSIS

***** ANSYS STRESS PASS *****

        ***** GENERAL GRAPH POSTPROCESSOR (POST26) *****

ENTER  /SHOW,DEVICE-NAME  TO ENABLE GRAPHIC DISPLAY
ENTER  FINISH             TO LEAVE POST26

ALL POST26 SPECIFICATIONS ARE RESET TO INITIAL DEFAULTS

VARIABLE  2  IS ELEMENT   117  ITEM  72  NAME= 117  N147

VARIABLE  3  IS ELEMENT    40  ITEM  72  NAME= 40   N70

VARIABLE  4  IS ELEMENT   184  ITEM  72  NAME= 184  N216

VARIABLE  5  IS ELEMENT   217  ITEM  87  NAME= 217  N269

VARIABLE  6  IS ELEMENT    59  ITEM  87  NAME= 59   N95

VARIABLE  7  IS ELEMENT    37  ITEM  82  NAME= 37   N69

VARIABLE  8  IS ELEMENT   162  ITEM  72  NAME= 162  N196

/SHOW SWITCH PLOTS TO FILE SI147             - RASTER MODE.

NEW TITLE= END DROP S.I. (ELEM. 117. NODE 147)


LABY GRAPH PLOT LABEL = PSI

LABX GRAPH PLOT LABEL = SEC.

STORAGE COMPLETE FOR     49 DATA POINTS

        SUMMARY OF VARIABLES STORED THIS STEP AND EXTREME VALUES
VARI TYPE  IDENTIFIERS  NAME   MINIMUM    AT TIME     MAXIMUM   AT TIME

  2 ESTR   117  72     117 N147   2139.     0.3014E-02 0.5123E+05 0.1644E-02
  3 ESTR    40  72     40  N70    1337.     0.2729E-03 0.1188E+05 0.9315E-02
  4 ESTR   184  72     184 N216   97.39     0.2729E-03 0.2703E+05 0.9042E-02
  5 ESTR   217  87     217 N269   23.84     0.2729E-03 0.2084E+05 0.4109E-02
  6 ESTR    59  87     59  N95    3091.     0.1206E-01 0.1672E+06 0.1919E-02
  7 ESTR    37  82     37  N69    1685.     0.2741E-02 0.2037E+05 0.1233E-01
  8 ESTR   162  72     162 N196   360.5     0.2729E-03 0.4254E+05 0.1096E-01

DATA FILE CHANGED TO FILE10

VARIABLE  9 IS   216 UZ

VARIABLE 10 IS   269 UZ

NEW TITLE= TOP PLATE END DROP DISP. VS. TIME (NODES 216 & 269)

LABY GRAPH PLOT LABEL = IN.

STORAGE COMPLETE FOR   4568 DATA POINTS

        SUMMARY OF VARIABLES STORED THIS STEP AND EXTREME VALUES
VARI TYPE  IDENTIFIERS  NAME   MINIMUM    AT TIME     MAXIMUM   AT TIME

  9 DISP   216  UZ     216 UZ   -0.3684E-01 0.6655E-02 0.4183E-03 0.5488E-02
 10 DISP   269  UZ     269 UZ   -0.3888E-01 0.6397E-02 0.2518E-03 0.1363E-01
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
/PREP7
/TITLE,D.U. SHIELD BLOCK BOTTOM END DROP ANALYSIS
KAN,0
ET,1,63
ET,2,45
C*** STAINLESS STEEL CASING MATERIAL PROPERTIES ***
DENS,1,,0.000738
EX,1,25.8E6
NUXY,1,0.3
C*** DEPLETED URANIUM MATERIAL PROPERTIES ***
DENS,2,,0.001757
EX,2,26.5E6
NUXY,2,0.2
C*** COVER PLATE THICKNESS ***
R,1,0.06
C*** COVER END THICKNESS ***
R,2,0.19
C*** TOP/BOTTOM BAR THICKNESS ***
R,3,0.5
C*** STUD PROPERTIES ***
R,4,0.375,0.1875
C*** CASING NODES ***
C*** BACK COVER PLATE
N,1
N,16,14.57
FILL
NGEN,8,16,1,16,1,0,1
C*** FRONT COVER PLATE ***
NGEN,2,128,1,16,15,0,0,0.47
NGEN,2,128,3,14,11,0,0,1.07
FILL,129,131,1
FILL,131,142
FILL,142,144
NGEN,8,16,129,144,1,0,1
C*** BOTTOM BAR NODES ***
NGEN,2,255,2,15,1,0,0,0.535
C*** TOP BAR NODES ***
NGEN,2,157,114,127,1,0,0,0.535
C*** D.U. CORE NODES ***
NGEN,2,1000,1,270,1
NGEN,8,14,1257,1270,1,,1
C*** BACK COVER PLATE ELEMENTS ***
REAL,1
E,1,2,18,17
EGEN,15,1,-1
EGEN,7,16,-16
C*** FRONT COVER PLATE ELEMENTS ***
EGEN,2,128,-105
C*** END COVER ELEMENTS ***
REAL,2
E,1,129,145,17
EGEN,7,16,-1
E,16,144,160,32
EGEN,7,16,-1
C*** BOTTOM BAR ELEMENTS ***
REAL,3
E,1,2,257,129
E,2,3,258,257
EGEN,13,1,-1
E,15,16,144,270
E,129,257,130
E,257,258,131,130
EGEN,13,1,-1
E,270,144,143
C*** TOP BAR ELEMENTS ***
E,113,114,271,241
E,114,115,272,271
EGEN,13,1,-1
E,127,128,256,284
E,241,271,242
E,271,272,243,242
EGEN,13,1,-1
E,284,256,255
```

```
C*** D.U. CORE ELEMENTS ***
TYPE,2
MAT,2
E,1001,1002,1257,1129,1017,1018,1271,1145
E,1002,1003,1258,1257,1018,1019,1272,1271
EGEN,13,1,-1
E,1015,1016,1144,1270,1031,1032,1160,1284
E,1129,1257,1130,1130,1145,1271,1146,1146
E,1257,1258,1131,1130,1271,1272,1147,1146
EGEN,13,1,-1
E,1270,1144,1143,1143,1284,1160,1159,1159
E,1017,1018,1271,1145,1033,1034,1285,1161
E,1018,1019,1272,1271,1034,1035,1286,1285
EGEN,13,1,-1
E,1031,1032,1160,1284,1047,1048,1176,1298
E,1145,1271,1146,1146,1161,1285,1162,1162
E,1271,1272,1147,1146,1285,1286,1163,1162
EGEN,13,1,-1
E,1284,1160,1159,1159,1298,1176,1175,1175
E,1033,1034,1285,1161,1049,1050,1299,1177
E,1034,1035,1286,1285,1050,1051,1300,1299
EGEN,13,1,-1
E,1047,1048,1176,1298,1063,1064,1192,1312
E,1161,1285,1162,1162,1177,1299,1178,1178
E,1285,1286,1163,1162,1299,1300,1179,1178
EGEN,13,1,-1
E,1298,1176,1175,1175,1312,1192,1191,1191
E,1049,1050,1299,1177,1065,1066,1313,1193
E,1050,1051,1300,1299,1066,1067,1314,1313
EGEN,13,1,-1
E,1063,1064,1192,1312,1079,1080,1208,1326
E,1177,1299,1178,1178,1193,1313,1194,1194
E,1299,1300,1179,1178,1313,1314,1195,1194
EGEN,13,1,-1
E,1312,1192,1191,1191,1326,1208,1207,1207
E,1065,1066,1313,1193,1081,1082,1327,1209
E,1066,1067,1314,1313,1082,1083,1328,1327
EGEN,13,1,-1
E,1079,1080,1208,1326,1095,1096,1224,1340
E,1193,1313,1194,1194,1209,1327,1210,1210
E,1313,1314,1195,1194,1327,1328,1211,1210
EGEN,13,1,-1
E,1326,1208,1207,1207,1340,1224,1223,1223
E,1081,1082,1327,1209,1097,1098,1341,1225
E,1082,1083,1328,1327,1098,1099,1342,1341
EGEN,13,1,-1
E,1095,1096,1224,1340,1111,1112,1240,1354
E,1209,1327,1210,1210,1225,1341,1226,1226
E,1327,1328,1211,1210,1341,1342,1227,1226
EGEN,13,1,-1
E,1340,1224,1223,1223,1354,1240,1239,1239
E,1097,1098,1341,1225,1113,1114,1355,1241
E,1098,1099,1342,1341,1114,1115,1356,1355
EGEN,13,1,-1
E,1111,1112,1240,1354,1127,1128,1256,1368
E,1225,1341,1226,1226,1241,1355,1242,1242
E,1341,1342,1227,1226,1355,1356,1243,1242
EGEN,13,1,-1
E,1354,1240,1239,1239,1368,1256,1255,1255
C*** COUPLED NODES ***
CP,1,UX,1,1001
CPSGEN,256,1,1
CP,257,UZ,1,1001
CPSGEN,256,1,257
CP,513,UY,1,1001
CPSGEN,16,1,513
CP,529,UY,129,1129
CPSGEN,16,1,529
CP,545,UY,257,1257
CPSGEN,14,1,545
C*** BOUNDARY CONSTRAINTS ***
D,272,UY,0.0,,273,1,UX,UZ
D,275,UY,0.0,,,,UX,UZ
D,277,UY,0.0,,278,1,UX,UZ ,
D,280,UY,0.0,,,,UX,UZ
```

```
D,282,UY,0.0,,283,1,UX,UZ
D,258,UX,0.0,,259,1,UZ
D,261,UX,0.0,,,,UZ
D,263,UX,0.0,,264,1,UZ
D,266,UX,0.0,,,,UZ
D,268,UX,0.0,,269,1,UZ
NLIST,ALL
ELIST,ALL
RLIST,ALL
MPLIST,ALL
ETLIST,ALL
DLIST,ALL
CPLIST,ALL
C*** LOADING ***
WSORT,X
ACEL,0,221794
AFWRITE
FINISH
C*** SOLUTION PHASE ***
/INPUT,27
FINISH
C*** POSTPROCESSING ***
/POST1
SET,1,1
TOP
ESEL,TYPE,1
PRNSTR,SI
MID
PRNSTR,SI
BOT
PRNSTR,SI
NSEL,Y,0
NASEL,Y,7
NASEL,X,0
NASEL,X,14,15
PREFOR
NASEL,NODE,272,273
NASEL,NODE,275
NASEL,NODE,277,278
NASEL,NODE,280
NASEL,NODE,282,283
PRRFOR
FINISH
/OUTPUT
/EOF
```

********** ANSYS OUTPUT DATA LISTING **********

*** ANSYS REV 4.4 38122-PC/LIN-4.4 CP= 8.840 ****
FOR SUPPORT CALL ROBERT QUINN PHONE (408) 281-6151 TWX

NEW TITLE= D.U. SHIELD BLOCK BOTTOM END DROP ANALYSIS

ANALYSIS TYPE= 0 (STATIC ANALYSIS)

SHELL STRESSES ARE AT TOP

NODE	SIG1	SIG2	SIG3	SI	SIGE
MINIMUMS					
NODE	272	272	272	269	269
VALUE	-0.43737996E-06	-34428.339	-41701.674	4479.5807	3900.5297
MAXIMUMS					
NODE	238	237	11	272	272
VALUE	34821.915	7933.0047	0.83793993E-06	41701.674	38586.004

SHELL STRESSES ARE SHELL MIDDLE

NODE	SIG1	SIG2	SIG3	SI	SIGE
MINIMUMS					
NODE	278	276	113	278	278
VALUE	22.829280	-24.092705	-3103.8670	161.83158	158.58038
MAXIMUMS					
NODE	238	237	223	238	238
VALUE	34214.616	7821.5795	0.33241633E-06	34214.616	31758.080

SHELL STRESSES ARE AT BOTTOM

MINIMUMS					
NODE	270	284	281	270	270
VALUE	-0.30211071E-07	-2341.0730	-16029.002	3642.7523	3179.1807
MAXIMUMS					
NODE	272	272	272	272	272
VALUE	41697.366	35342.538	0.45703880E-06	41697.366	38915.045

***** ROUTINE COMPLETED ***** CP = 467.470

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
/PREP7
/TITLE,IF300 2" SPACER DISK 0 DEG. SIDE DROP ANALYSIS
ET,1,42,,,3
ET,2,21,,,4
ET,3,12,,,1
KAN,4
KAY,5,2
GAMMA,0.02,20
DENS,1,0.00073
MUXY,1,0.29
EX,1,26.2E6
C*** REAL CONSTANTS
R,1,2.0
R,2,0.01771
R,3,0.03341
R,104,8.95,1.0E11,-0.080,3.0
R,105,11.94,1.0E11,-0.075,3.0
R,106,14.92,1.0E11,-0.070,3.0
R,107,17.92,1.0E11,-0.065,3.0
R,108,20.90,1.0E11,-0.061,3.0
R,109,23.88,1.0E11,-0.056,3.0
R,110,26.87,1.0E11,-0.052,3.0
R,111,29.85,1.0E11,-0.047,3.0
R,112,32.84,1.0E11,-0.043,3.0
R,113,35.83,1.0E11,-0.039,3.0
R,114,38.82,1.0E11,-0.033,3.0
R,115,41.81,1.0E11,-0.031,3.0
R,116,44.79,1.0E11,-0.028,3.0
R,117,47.78,1.0E11,-0.024,3.0
R,118,50.77,1.0E11,-0.021,3.0
R,119,53.77,1.0E11,-0.018,3.0
R,120,56.76,1.0E11,-0.015,3.0
R,121,59.76,1.0E11,-0.013,3.0
R,122,62.74,1.0E11,-0.010,3.0
R,123,65.73,1.0E11,-0.008,3.0
R,124,68.73,1.0E11,-0.006,3.0
R,125,71.72,1.0E11,-0.005,3.0
R,126,74.71,1.0E11,-0.003,3.0
R,127,77.72,1.0E11,-0.002,3.0
R,128,80.71,1.0E11,-0.001,3.0
C*** NODE GENERATION
CSYS,1
N,1,18.655,-90
N,31,18.655,0
FILL
NGEN,2,31,1,31,1,-0.49
NDELE,39
CSYS,0
N,63,0,-17
N,64,0.4,-17
N,70,6.4,-17
FILL
N,71,0,-16
N,72,.4,-16
N,73,6.4,-16
N,74,7.2,-16
NGEN,2,5,71,74,1,,1.0
N,80,8.2,-15
N,81,9.2,-15
NGEN,2,6,76,81,1,,1.0
```

********** ANSYS INPUT DATA LISTING (FILE16) **********

```
  61  N,88,10.2,-14
  62  NGEN,2,7,82,88,1,,1.0
  63  N,96,11.2,-13
  64  N,97,12.2,-13
  65  NGEN,2,9,89,97,1,,1.0
  66  N,107,13.2,-12
  67  N,108,0,-11
  68  N,109,.4,-11
  69  N,115,6.4,-11
  70  FILL
  71  N,116,7.2,-11
  72  N,122,13.2,-11
  73  FILL
  74  NGEN,2,15,108,115,1,,.375
  75  N,131,6.8,-10.625
  76  NGEN,2,9,123,131,1,,.375
  77  N,141,7.2,-10.25
  78  N,147,13.2,-10.25
  79  FILL
  80  N,148,13.6,-10.25
  81  N,149,14.6,-10.25
  82  N,150,0,-9.25
  83  N,151,.4,-9.25
  84  N,152,6.4,-9.25
  85  N,153,6.8,-9.25
  86  N,154,7.2,-9.25
  87  N,155,13.2,-9.25
  88  N,156,13.6,-9.25
  89  N,157,14.6,-9.25
  90  NGEN,2,8,150,157,1,,1.0
  91  N,166,13.6,-8.25
  92  NGEN,2,9,158,166,1,,1.0
  93  NGEN,2,9,167,175,1,,1.0
  94  N,183,16.6,-6.25
  95  NGEN,2,10,176,185,1,,1.0
  96  NGEN,2,64,132,148,1,,6.0
  97  N,215,16.6,-4.25
  98  FILL,212,215
  99  N,216,0,-3.625
 100  N,219,3,-3.625
 101  FILL
 102  N,220,3.8,-3.625
 103  N,226,9.8,-3.625
 104  FILL
 105  N,227,10.6,-3.625
 106  N,233,16.6,-3.625
 107  FILL
 108  NGEN,2,18,216,219,1,,0.625
 109  N,238,3.4,-3.0
 110  N,239,3.8,-3.0
 111  N,245,9.8,-3.0
 112  FILL
 113  N,246,10.2,-3.0
 114  N,247,10.6,-3.0
 115  N,253,16.6,-3.0
 116  FILL
 117  NGEN,2,17,237,239,1,,1.0
 118  NGEN,2,12,245,247,1,,1.0
 119  N,260,16.6,-2
 120  NGEN,3,7,254,260,1,,1.0
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
121   C*** ELEMENT GENERATION
122   E,1,2,33,32
123   EGEN,6,1,-1
124   E,7,8,70,38
125   E,8,9,40,70
126   E,9,10,41,40
127   EGEN,22,1,-1
128   E,32,64,63
129   E,32,33,64
130   E,33,34,65,64
131   EGEN,5,1,-1
132   E,38,70,69
133   E,63,64,72,71
134   E,70,40,74,73
135   E,40,41,74
136   E,71,72,77,76
137   E,73,74,79,78
138   E,74,41,80,79
139   E,41,42,81,80
140   E,42,43,81
141   E,76,77,83,82
142   E,78,79,85,84
143   E,79,80,86,85
144   E,80,81,87,86
145   E,81,43,44
146   E,81,44,88
147   E,81,88,87
148   E,82,83,90,89
149   E,84,85,92,91
150   EGEN,4,1,-1
151   E,88,45,96,95
152   E,44,45,88
153   E,45,46,96
154   E,46,87,96
155   E,44,47,97
156   E,89,90,99,98
157   E,91,92,101,100
158   EGEN,6,1,-1
159   E,97,47,106
160   E,47,107,106
161   E,47,48,107
162   E,98,99,109,108
163   E,100,101,116,115
164   EGEN,7,1,-1
165   E,48,49,107
166   E,107,49,122
167   E,49,30,122
168   E,108,109,124,123
169   EGEN,7,1,-1
170   E,115,131,130
171   E,115,116,131
172   E,123,124,133,132
173   EGEN,7,1,-1
174   E,130,131,140,139
175   E,131,116,141
176   E,131,141,140
177   E,116,117,142,141
178   EGEN,6,1,-1
179   E,122,148,147
180   E,122,50,148
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
E,148,50,149
E,50,51,149
E,132,133,151,150
E,139,140,153,152
E,140,141,136,153
E,147,148,156,155
E,148,149,157,156
E,149,51,157
E,51,52,157
E,150,151,159,158
E,152,153,161,160
E,153,154,162,161
E,155,156,164,163
E,156,157,165,164
E,157,52,166,165
E,52,53,166
E,158,159,168,167
E,160,161,170,169
E,161,162,171,170
E,163,164,173,172
E,164,165,174,173
E,165,166,175,174
E,166,53,54,175
E,167,168,177,176
E,169,170,179,178
E,170,171,180,179
E,172,173,182,181
EGEN,3,1,-1
E,175,54,185,184
E,54,55,185
E,176,177,187,186
E,178,179,189,188
E,179,180,190,189
E,181,182,192,191
EGEN,4,1,-1
E,55,56,185
E,185,56,195
E,186,187,197,196
E,188,189,204,203
E,189,190,205,204
E,191,192,212,211
EGEN,4,1,-1
E,195,56,57
E,195,57,215
E,215,57,58
E,196,197,216
E,197,198,217,216
EGEN,3,1,-1
E,200,220,219
E,200,201,221,220
EGEN,3,1,-1
E,203,204,223
E,204,205,223
E,205,206,224,223
EGEN,3,1,-1
E,208,227,226
E,208,209,228,227
EGEN,3,1,-1
E,211,212,230
E,212,213,231,230
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
241   EGEN,3,1,-1
242   E,215,58,233
243   E,216,217,235,234
244   EGEN,3,1,-1
245   E,219,238,237
246   E,219,220,238
247   E,220,239,238
248   E,220,221,240,239
249   EGEN,6,1,-1
250   E,226,246,245
251   E,226,227,246
252   E,227,247,246
253   E,227,228,248,247
254   EGEN,6,1,-1
255   E,233,58,59,253
256   E,237,238,255,254
257   E,238,239,256,255
258   E,245,246,258,257
259   E,246,247,259,258
260   E,253,59,60,260
261   E,254,255,262,261
262   E,255,256,263,262
263   E,257,258,265,264
264   E,258,259,266,265
265   E,260,60,61,267
266   E,261,262,269,268
267   E,262,263,270,269
268   E,264,265,272,271
269   E,265,266,273,272
270   E,267,61,62,274
271   C*** SYMMETRIC GENERATION
272   SYMM,1,1000,1,500
273   ESYM,2,1000,1,500
274   MERGE
275   C*** BOUNDARY NODES
276   NGEN,2,2000,4,28,1
277   CSYS,0
278   C*** MASS ELEMENTS
279   TYPE,2
280   REAL,2
281   E,233
282   E,274
283   E,147
284   E,211
285   E,245
286   E,271
287   E,70
288   E,115
289   E,139
290   E,203
291   E,237
292   E,268
293   E,1247
294   E,1273
295   E,1239
296   E,1270
297   E,1141
298   E,1205
299   E,1064
300   E,1109
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
E,1133
E,1197
REAL,3
E,260
E,267
E,257
E,264
E,254
E,261
E,155
E,163
E,172
E,181
E,191
E,152
E,160
E,169
E,178
E,188
E,73
E,78
E,84
E,91
E,100
E,1072
E,1077
E,1083
E,1090
E,1099
E,1151
E,1159
E,1168
E,1177
E,1187
E,1154
E,1162
E,1171
E,1180
E,1190
E,1266
E,1259
E,1263
E,1256
C*** GAP ELEMENTS
TYPE,3
REAL,104
E,2004,4
REAL,105
E,2005,5
REAL,106
E,2006,6
REAL,107
E,2007,7
REAL,108
E,2008,8
REAL,109
E,2009,9
REAL,110
E,2010,10
REAL,111
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
361   E,2011,11
362   REAL,112
363   E,2012,12
364   REAL,113
365   E,2013,13
366   REAL,114
367   E,2014,14
368   REAL,115
369   E,2015,15
370   REAL,116
371   E,2016,16
372   REAL,117
373   E,2017,17
374   REAL,118
375   E,2018,18
376   REAL,119
377   E,2019,19
378   REAL,120
379   E,2020,20
380   REAL,121
381   E,2021,21
382   REAL,122
383   E,2022,22
384   REAL,123
385   E,2023,23
386   REAL,124
387   E,2024,24
388   REAL,125
389   E,2025,25
390   REAL,126
391   E,2026,26
392   REAL,127
393   E,2027,27
394   REAL,128
395   E,2028,28
396   WSORT,Y
397   C*** BOUNDARY CONDITIONS
398   SYMBC,0,2,0
399   D,31,ALL,0.0
400   CSYS,1
401   NROTATE,29,30
402   D,29,UX,0.0
403   D,30,UX,0.0
404   CSYS,0
405   D,93,UZ,0.0
406   D,94,UZ,0.0
407   D,95,UZ,0.0
408   D,102,UZ,0.0
409   D,103,UZ,0.0
410   D,104,UZ,0.0
411   D,117,UZ,0.0
412   D,118,UZ,0.0
413   D,119,UZ,0.0
414   D,1093,UZ,0.0
415   D,1094,UZ,0.0
416   D,1095,UZ,0.0
417   D,1102,UZ,0.0
418   D,1103,UZ,0.0
419   D,1104,UZ,0.0
420   D,1117,UZ,0.0
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
421   D,1118,UZ,0.0
422   D,1119,UZ,0.0
423   D,2004,ALL,0.0,,2028,1
424   C*** LOADING CONDITIONS
425   TIME,0.6E-3
426   ITER,12,,1
427   ACEL,-82689.6
428   LWRITE
429   TIME,0.95E-3
430   ITER,7,,1
431   ACEL,-37094.4
432   LWRITE
433   TIME,10E-3
434   ITER,50,0,1
435   LWRITE
436   TIME,19.4E-3
437   ITER,25,,1
438   ACEL,0,0.0
439   LWRITE
440   TIME,.03
441   ITER,20,,1
442   LWRITE
443   AFWRITE
444   FINISH
445   /EXEC
446   /INPUT,27
447   FINISH
448   /POST26
449   TIME,0,0.03
450   DISP,2,273,UY
451   DISP,3,171,UY
452   ESTR,4,219,40,SI
453   ESTR,5,178,45,SI
454   ESTR,6,177,45,SI
455   ESTR,7,176,45,SI
456   ESTR,8,130,40,SI
457   ESTR,9,100,45,SI
458   /SHOW,PLOTS
459   PLVAR,2,3
460   PLVAR,4,8,9
461   PLVAR,5,6,7
462   EXTREM,2,9,1
463   FINISH
464   /POST1
465   SET,,,,0.4751E-2
466   AVPRIN,1
467   GLOBAL,1
468   /SHOW,PLOTS
469   PLNSTR,SI
470   PRNSTR,SI
471   SET,,,,0.8733E-2
472   AVPRIN,1
473   GLOBAL,1
474   /SHOW,PLOTS
475   PLNSTR,SI
476   PRNSTR,SI
477   SET,,,,0.1855E-2
478   AVPRIN,1
479   GLOBAL,1
480   /SHOW,PLOTS
```

```
          ********** ANSYS INPUT DATA LISTING (FILE18) **********

481   PLNSTR,S1
482   PLNSTR,S1
483   SET.....0.5113E-2
484   AVPRIN,1
485   GLOBAL,1
486   /SHOW,PLOTS
487   PLNSTR,S1
488   PLNSTR,S1
489   SET.....0.1674E-2
490   AVPRIN,1
491   GLOBAL,1
492   /SHOW,PLOTS
493   PLNSTR,S1
494   PLNSTR,S1
495   FINISH
496   /EOF
```

```
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IF300 2" SPACER DISK 0 DEG. SIDE DROP ANALYSIS                          21.8723  MAR  5.1990 CP=  15012.340

        ***** GENERAL GRAPH POSTPROCESSOR ( POST26) *****

ALL POST26 SPECIFICATIONS ARE RESET TO INITIAL DEFAULTS

MINIMUM TIME= 0.00000E+00   MAXIMUM TIME= 0.30000E-01

*** NOTE ***
REDEFINITION OF TIME RANGE ERASES ALL PREVIOUSLY STORED OR CALCULATED DATA

VARIABLE  2 IS   273 UY

VARIABLE  3 IS   171 UY

VARIABLE  4  IS ELEMENT   219  ITEM  40  NAME= 219  SI

VARIABLE  5  IS ELEMENT   178  ITEM  45  NAME= 178  SI

VARIABLE  6  IS ELEMENT   177  ITEM  45  NAME= 177  SI

VARIABLE  7  IS ELEMENT   176  ITEM  45  NAME= 176  SI

VARIABLE  8  IS ELEMENT   130  ITEM  40  NAME= 130  SI

VARIABLE  9  IS ELEMENT   100  ITEM  45  NAME= 100  SI

/SHOW SWITCH PLOTS TO FILE PLOTS            - RASTER MODE.

STORAGE COMPLETE FOR    114 DATA POINTS

        SUMMARY OF VARIABLES STORED THIS STEP AND EXTREME VALUES
VARI TYPE  IDENTIFIERS  NAME   MINIMUM     AT TIME      MAXIMUM     AT TIME

  2 DISP   273   UY     273 UY    0.0000E+00 0.3000E-01 0.0000E+00 0.3000E-01
  3 DISP   171   UY     171 UY   -0.5807E-02 0.4570E-02 0.5993E-02 0.3484E-02
  4 ESTR   219   40     219 SI    0.3118E-01 0.5000E-04 0.4762E+05 0.4751E-02
  5 ESTR   178   45     178 SI     1.064     0.5000E-04 0.3419E+05 0.8733E-02
  6 ESTR   177   45     177 SI    0.6043     0.5000E-04 0.3783E+05 0.8733E-02
  7 ESTR   176   45     176 SI    0.4308     0.5000E-04 0.3466E+05 0.1855E-02
  8 ESTR   130   40     130 SI    0.4209E-02 0.5000E-04 0.5655E+05 0.5113E-02
  9 ESTR   100   45     100 SI    0.1595E-01 0.5000E-04 0.2482E+05 0.1674E-02

PLOT DEFINITION
CURVE  VARIABLE   NAME
   1        2   273 UY
   2        3   171 UY

CUMULATIVE DISPLAY NUMBER   1 WRITTEN TO FILE PLOTS            - RASTER MODE.
DISPLAY TITLE= IF300 2" SPACER DISK 0 DEG. SIDE DROP ANALYSIS

PLOT DEFINITION
CURVE  VARIABLE   NAME
   1        4   219 SI
   2        8   130 SI
   3        9   100 SI

CUMULATIVE DISPLAY NUMBER   2 WRITTEN TO FILE PLOTS            - RASTER MODE.
DISPLAY TITLE= IF300 2" SPACER DISK 0 DEG. SIDE DROP ANALYSIS

PLOT DEFINITION
CURVE  VARIABLE   NAME
   1        5   178 SI
   2        6   177 SI
   3        7   176 SI

CUMULATIVE DISPLAY NUMBER   3 WRITTEN TO FILE PLOTS            - RASTER MODE.
DISPLAY TITLE= IF300 2" SPACER DISK 0 DEG. SIDE DROP ANALYSIS

        POST26 SUMMARY OF VARIABLE EXTREME VALUES
VARI TYPE  IDENTIFIERS  NAME   MINIMUM     AT TIME      MAXIMUM     AT TIME

  2 DISP   273   UY     273 UY    0.0000E+00 0.3000E-01 0.0000E+00 0.3000E-01
  3 DISP   171   UY     171 UY   -0.5807E-02 0.4570E-02 0.5993E-02 0.3484E-02
  4 ESTR   219   40     219 SI    0.3118E-01 0.5000E-04 0.4762E+05 0.4751E-02
  5 ESTR   178   45     178 SI     1.064     0.5000E-04 0.3419E+05 0.8733E-02
  6 ESTR   177   45     177 SI    0.6043     0.5000E-04 0.3783E+05 0.8733E-02
  7 ESTR   176   45     176 SI    0.4308     0.5000E-04 0.3466E+05 0.1855E-02
  8 ESTR   130   40     130 SI    0.4209E-02 0.5000E-04 0.5655E+05 0.5113E-02
  9 ESTR   100   45     100 SI    0.1595E-01 0.5000E-04 0.2482E+05 0.1674E-02

***** ROUTINE COMPLETED *****  CP =      15214.850
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
/PREP7
/TITLE,IF300 2" SPACER DISK 90 DEG. SIDE DROP ANALYSIS
ET,1,42,,,3
ET,2,21,,,4
ET,3,12,,,1
KAN,4
KAY,3,2
GAMMA,0.02,20
DENS,1,0.00073
NUXY,1,0.29
EX,1,26.2E6
C*** REAL CONSTANTS
R,1,2.0
R,2,0.01771
R,3,0.03541
R,104,8.95,1.0E8,-0.001,3.0
R,105,11.94,1.0E8,-0.002,3.0
R,106,14.92,1.0E8,-0.003,3.0
R,107,17.92,1.0E8,-0.005,3.0
R,108,20.90,1.0E8,-0.004,3.0
R,109,23.88,1.0E8,-0.006,3.0
R,110,26.87,1.0E8,-0.010,3.0
R,111,29.85,1.0E8,-0.013,3.0
R,112,32.84,1.0E8,-0.015,3.0
R,113,35.83,1.0E8,-0.018,3.0
R,114,38.82,1.0E8,-0.021,3.0
R,115,41.81,1.0E8,-0.024,3.0
R,116,44.79,1.0E8,-0.028,3.0
R,117,47.78,1.0E8,-0.031,3.0
R,118,50.77,1.0E8,-0.035,3.0
R,119,53.77,1.0E8,-0.039,3.0
R,120,56.76,1.0E8,-0.043,3.0
R,121,59.76,1.0E8,-0.047,3.0
R,122,62.74,1.0E8,-0.052,3.0
R,123,65.73,1.0E8,-0.056,3.0
R,124,68.73,1.0E8,-0.061,3.0
R,125,71.72,1.0E8,-0.065,3.0
R,126,74.71,1.0E8,-0.070,3.0
R,127,77.72,1.0E8,-0.075,3.0
R,128,80.71,1.0E8,-0.080,3.0
R,129,83.71,1.0E8,-0.084,3.0
R,130,86.71,1.0E8,-0.090,3.0
C*** NODE GENERATION
CSYS,1
N,1,18.655,-90
N,31,18.655,0
FILL
NGEN,2,31,1,31,1,,-0.49
NDELE,39
CSYS,0
N,63,0,-17
N,64,0.4,-17
N,70,6.4,-17
FILL
N,71,0,-16
N,72,.4,-16
N,73,6.4,-16
N,74,7.2,-16
NGEN,2,3,71,74,1,,1.0
N,80,8.2,-15
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
  61  N,81,9.2,-15
  62  NGEN,2,6,76,81,1,,1.0
  63  N,88,10.2,-14
  64  NGEN,2,7,82,88,1,,1.0
  65  N,96,11.2,-13
  66  N,97,12.2,-13
  67  NGEN,2,9,89,97,1,,1.0
  68  N,107,13.2,-12
  69  N,108,0,-11
  70  N,109,.4,-11
  71  N,115,6.4,-11
  72  FILL
  73  N,116,7.2,-11
  74  N,122,13.2,-11
  75  FILL
  76  NGEN,2,15,108,115,1,,.375
  77  N,131,6.8,-10.625
  78  NGEN,2,9,123,131,1,,.375
  79  N,141,7.2,-10.25
  80  N,147,13.2,-10.25
  81  FILL
  82  N,148,13.6,-10.25
  83  N,149,14.6,-10.25
  84  N,150,0,-9.25
  85  N,151,.4,-9.25
  86  N,152,6.4,-9.25
  87  N,153,6.8,-9.25
  88  N,154,7.2,-9.25
  89  N,155,13.2,-9.25
  90  N,156,13.6,-9.25
  91  N,157,14.6,-9.25
  92  NGEN,2,8,150,157,1,,1.0
  93  N,166,15.6,-8.25
  94  NGEN,2,9,158,166,1,,1.0
  95  NGEN,2,9,167,175,1,,1.0
  96  N,185,16.6,-6.25
  97  NGEN,2,10,176,185,1,,1.0
  98  NGEN,2,64,132,148,1,,6.0
  99  N,215,16.6,-4.25
 100  FILL,212,215
 101  N,216,0,-3.625
 102  N,219,3,-3.625
 103  FILL
 104  N,220,3.8,-3.625
 105  N,226,9.8,-3.625
 106  FILL
 107  N,227,10.6,-3.625
 108  N,233,16.6,-3.625
 109  FILL
 110  NGEN,2,18,216,219,1,,0.625
 111  N,238,3.4,-3.0
 112  N,239,3.8,-3.0
 113  N,245,9.8,-3.0
 114  FILL
 115  N,246,10.2,-3.0
 116  N,247,10.6,-3.0
 117  N,253,16.6,-3.0
 118  FILL
 119  NGEN,2,17,237,239,1,,1.0
 120  NGEN,2,12,245,247,1,,1.0
```

********** ANSYS INPUT DATA LISTING (FILE:8) **********

```
121   N,260,16.6,-2
122   NGEN,3,7,254,260,1.,1.0
123   C**** ELEMENT GENERATION
124   E,1,2,33,32
125   EGEN,6,1,-1
126   E,7,8,70,38
127   E,8,9,40,70
128   E,9,10,41,40
129   EGEN,22,1,-1
130   E,32,64,63
131   E,32,33,64
132   E,33,34,65,64
133   EGEN,5,1,-1
134   E,38,70,69
135   E,63,64,72,71
136   E,70,40,74,73
137   E,40,41,74
138   E,71,72,77,76
139   E,73,74,79,78
140   E,74,41,80,79
141   E,41,42,81,80
142   E,42,43,81
143   E,76,77,83,82
144   E,78,79,85,84
145   E,79,80,86,85
146   E,80,81,87,86
147   E,81,43,44
148   E,81,44,88
149   E,81,88,87
150   E,82,83,90,89
151   E,84,85,92,91
152   EGEN,4,1,-1
153   E,88,45,96,95
154   E,44,45,88
155   E,45,46,96
156   E,46,97,96
157   E,46,47,97
158   E,89,90,99,98
159   E,91,92,101,100
160   EGEN,6,1,-1
161   E,97,47,106
162   E,47,107,106
163   E,47,48,107
164   E,98,99,109,108
165   E,100,101,116,115
166   EGEN,7,1,-1
167   E,48,49,107
168   E,107,49,122
169   E,49,50,122
170   E,108,109,124,123
171   EGEN,7,1,-1
172   E,115,131,130
173   E,115,116,131
174   E,123,124,133,132
175   EGEN,7,1,-1
176   E,130,131,140,139
177   E,131,116,141
178   E,131,141,140
179   E,116,117,142,141
180   EGEN,6,1,-1
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
E,122,148,147
E,122,50,148
E,148,50,149
E,50,51,149
E,132,133,151,150
E,139,140,153,152
E,140,141,154,153
E,147,148,156,155
E,148,149,157,156
E,149,51,157
E,51,52,157
E,150,151,159,158
E,152,153,161,160
E,153,154,162,161
E,155,156,164,163
E,156,157,165,164
E,157,52,166,165
E,52,53,166
E,158,159,168,167
E,160,161,170,169
E,161,162,171,170
E,163,164,173,172
E,164,165,174,173
E,165,166,175,174
E,166,53,54,175
E,167,168,177,176
E,169,170,179,178
E,170,171,180,179
E,172,173,182,181
EGEN,3,1,-1
E,175,54,185,184
E,54,55,185
E,176,177,187,186
E,178,179,189,188
E,179,180,190,189
E,181,182,192,191
EGEN,4,1,-1
E,55,56,185
E,185,56,195
E,186,187,197,196
E,188,189,204,203
E,189,190,205,204
E,191,192,212,211
EGEN,4,1,-1
E,193,56,57
E,195,57,215
E,215,57,58
E,196,197,216
E,197,198,217,216
EGEN,3,1,-1
E,200,220,219
E,200,201,221,220
EGEN,3,1,-1
E,203,204,223
E,204,205,223
E,205,206,224,223
EGEN,3,1,-1
E,208,227,226
E,208,209,228,227
EGEN,3,1,-1
```

IF-300 Cask Channelled BWR Fuel Basket SAR

********** ANSYS INPUT DATA LISTING (FILE16) **********

```
241   E,211,212,230
242   E,212,213,231,230
243   EGEN,3,1,-1
244   E,215,38,233
245   E,216,217,235,234
246   EGEN,3,1,-1
247   E,219,238,237
248   E,219,220,238
249   E,220,239,238
250   E,220,221,240,239
251   EGEN,6,1,-1
252   E,226,246,245
253   E,226,227,246
254   E,227,247,246
255   E,227,228,248,247
256   EGEN,6,1,-1
257   E,233,38,39,253
258   E,237,238,255,254
259   E,238,239,256,255
260   E,245,246,258,257
261   E,246,247,259,258
262   E,253,39,60,260
263   E,254,255,262,261
264   E,255,256,263,262
265   E,257,258,265,264
266   E,258,259,266,265
267   E,260,60,61,267
268   E,261,262,269,268
269   E,262,263,270,269
270   E,264,265,272,271
271   E,265,266,273,272
272   E,267,61,62,274
273   C*** SYMMETRIC GENERATION
274   SYMM,2,1000,1,500
275   ESYM,2,1000,1,500
276   MERGE
277   C*** BOUNDARY NODES
278   NGEN,2,2000,4,30,1
279   CSYS,0
280   C*** MASS ELEMENTS
281   TYPE,2
282   REAL,2
283   E,64
284   E,70
285   E,133
286   E,139
287   E,141
288   E,147
289   E,234
290   E,237
291   E,239
292   E,245
293   E,247
294   E,253
295   E,1197
296   E,1203
297   E,1205
298   E,1211
299   E,1109
300   E,1115
```

********** ANSYS INPUT DATA LISTING (FILE16) **********

```
REAL,3
E,63
EGEN,5,1,-1
E,134
EGEN,5,1,-1
E,142
EGEN,5,1,-1
E,234
E,235
E,236
E,240
EGEN,5,1,-1
E,248
EGEN,5,1,-1
E,1198
EGEN,5,1,-1
E,1206
EGEN,5,1,-1
E,1110
EGEN,5,1,-1
C*** GAP ELEMENTS
TYPE,3
REAL,104
E,2004,4
REAL,103
E,2003,3
REAL,106
E,2006,6
REAL,107
E,2007,7
REAL,108
E,2008,8
REAL,109
E,2009,9
REAL,110
E,2010,10
REAL,111
E,2011,11
REAL,112
E,2012,12
REAL,113
E,2013,13
REAL,114
E,2014,14
REAL,115
E,2015,15
REAL,116
E,2016,16
REAL,117
E,2017,17
REAL,118
E,2018,18
REAL,119
E,2019,19
REAL,120
E,2020,20
REAL,121
E,2021,21
REAL,122
E,2022,22
```

********** ANSYS INPUT DATA LISTING (FILE16) **********

```
REAL,123
E,2023,23
REAL,124
E,2024,24
REAL,125
E,2025,25
REAL,126
E,2026,26
REAL,127
E,2027,27
REAL,128
E,2028,28
REAL,129
E,2029,29
REAL,130
E,2030,30
WSORT,Y
C*** BOUNDARY CONDITIONS
SYMOC,0,0,0
D,1,ALL,0.0
CSYS,1
WROTATE,2,3
D,2,UX,0.0
D,3,UX,0.0
CSYS,0
D,93,UZ,0.0
D,94,UZ,0.0
D,95,UZ,0.0
D,102,UZ,0.0
D,103,UZ,0.0
D,104,UZ,0.0
D,117,UZ,0.0
D,118,UZ,0.0
D,119,UZ,0.0
D,1093,UZ,0.0
D,1094,UZ,0.0
D,1095,UZ,0.0
D,1102,UZ,0.0
D,1103,UZ,0.0
D,1104,UZ,0.0
D,1117,UZ,0.0
D,1118,UZ,0.0
D,1119,UZ,0.0
D,2004,ALL,0.0,,2030,1
C*** LOADING CONDITIONS
TIME,0.3E-3
ITER,12,0,1
ACEL,,54096
LWRITE
TIME,0.48E-3
ITER,7,0,1
ACEL,,23995
LWRITE
TIME,15.8E-3
ITER,100,0,1
LWRITE
TIME,30.3E-3
ITER,50,0,1
ACEL,0,0,0
LWRITE
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
421   TIME,.03
422   ITER,25,0,1
423   LWRITE
424   AFWRITE
425   FINISH
426   /EXEC
427   /INPUT,27
428   FINISH
429   /POST26
430   TIME,0,0.03
431   DISP,2,82,UY
432   DISP,3,112,UY
433   ESTR,4,39,45,SI
434   ESTR,5,129,40,SI
435   ESTR,6,89,30,SI
436   ESTR,7,165,35,SI
437   ESTR,8,163,45,SI
438   ESTR,9,7,35,SI
439   ESTR,10,7,40,SI
440   /SHOW,PLOTS,,1
441   PLVAR,2,3
442   PLVAR,4,3
443   PLVAR,6,7,8
444   PLVAR,9,10
445   EXTREM,2,10,1
446   FINISH
447   /POST1
448   SET,,,,,0.6302E-2
449   AVPRIN,1
450   GLOBAL,1
451   /SHOW,PLOTS,,1
452   PLNSTR,SI
453   PRNSTR,SI
454   SET,,,,,0.2012E-2
455   AVPRIN,1
456   GLOBAL,1
457   /SHOW,PLOTS,,1
458   PLNSTR,SI
459   PRNSTR,SI
460   SET,,,,,0.1534E-1
461   AVPRIN,1
462   GLOBAL,1
463   /SHOW,PLOTS,,1
464   PLNSTR,SI
465   PRNSTR,SI
466   SET,,,,,0.2163E-2
467   AVPRIN,1
468   GLOBAL,1
469   /SHOW,PLOTS,,1
470   PLNSTR,SI
471   PRNSTR,SI
472   SET,,,,,0.1859E-2
473   AVPRIN,1
474   GLOBAL,1
475   /SHOW,PLOTS,,1
476   PLNSTR,SI
477   PRNSTR,SI
478   FINISH
479   /EOF
```

```
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 IF300 2" SPACER DISK 90 DEG. SIDE DROP ANALYSIS                          22.9071  MAR  6,1990 CP=  22534.060

         ***** GENERAL GRAPH POSTPROCESSOR (POST26) *****

 ALL POST26 SPECIFICATIONS ARE RESET TO INITIAL DEFAULTS

 MINIMUM TIME= 0.00000E+00   MAXIMUM TIME= 0.30000E-01

 *** NOTE ***
 REDEFINITION OF TIME RANGE ERASES ALL PREVIOUSLY STORED OR CALCULATED DATA

 VARIABLE  2 IS    82 UY

 VARIABLE  3 IS   112 UY

 VARIABLE  4  IS ELEMENT    39  ITEM 45  NAME= 39   SI

 VARIABLE  5  IS ELEMENT   129  ITEM 40  NAME= 129  SI

 VARIABLE  6  IS ELEMENT    89  ITEM 30  NAME= 89   SI

 VARIABLE  7  IS ELEMENT   165  ITEM 35  NAME= 165  SI

 VARIABLE  8  IS ELEMENT   163  ITEM 45  NAME= 163  SI

 VARIABLE  9  IS ELEMENT     7  ITEM 35  NAME= 7    SI

 VARIABLE 10  IS ELEMENT     7  ITEM 40  NAME= 7    SI

 /SHOW SWITCH PLOTS TO FILE PLOTS            - VECTOR MODE

 STORAGE COMPLETE FOR    167 DATA POINTS

         SUMMARY OF VARIABLES STORED THIS STEP AND EXTREME VALUES
 VARI TYPE  IDENTIFIERS  NAME   MINIMUM     AT TIME     MAXIMUM     AT TIME

   2 DISP    82   UY    82  UY  -0.4069E-02 0.6302E-02 0.1980E-02 0.2624E-01
   3 DISP   112   UY   112  UY  -0.1374E-01 0.1246E-02 0.1008E-01 0.2682E-01
   4 ESTR    39   45    39  SI    3.129     0.2500E-04 0.3067E+03 0.6302E-02
   5 ESTR   129   40   129  SI    0.4903E-05 0.2500E-04 0.2236E+03 0.2012E-02
   6 ESTR    89   30    89  SI    0.3077E-02 0.2500E-04 0.3068E+03 0.1534E-01
   7 ESTR   165   35   165  SI    0.3552E-04 0.2500E-04 0.3969E+03 0.2165E-02
   8 ESTR   163   45   163  SI    0.1097E-02 0.2500E-04 0.2406E+03 0.6302E-02
   9 ESTR     7   35     7  SI    0.1965E-01 0.2500E-04 0.5128E+03 0.1859E-02
  10 ESTR     7   40     7  SI    0.2084E-01 0.2500E-04 0.5625E+03 0.1859E-02

 PLOT DEFINITION
 CURVE  VARIABLE   NAME
    1        2    82  UY
    2        3   112 UY

 CUMULATIVE DISPLAY NUMBER   1 WRITTEN TO FILE PLOTS          - VECTOR MODE
 DISPLAY TITLE= IF300 2" SPACER DISK 90 DEG. SIDE DROP ANALYSIS

 PLOT DEFINITION
 CURVE  VARIABLE   NAME
    1        4    39  SI
    2        5   129 SI

 CUMULATIVE DISPLAY NUMBER   2 WRITTEN TO FILE PLOTS          - VECTOR MODE
 DISPLAY TITLE= IF300 2" SPACER DISK 90 DEG. SIDE DROP ANALYSIS

 PLOT DEFINITION
 CURVE  VARIABLE   NAME
    1        6    89  SI
    2        7   165 SI
    3        8   163 SI

 CUMULATIVE DISPLAY NUMBER   3 WRITTEN TO FILE PLOTS          - VECTOR MODE
 DISPLAY TITLE= IF300 2" SPACER DISK 90 DEG. SIDE DROP ANALYSIS

 PLOT DEFINITION
 CURVE  VARIABLE   NAME
    1        9    7   SI
    2       10    7   SI

 CUMULATIVE DISPLAY NUMBER   4 WRITTEN TO FILE PLOTS          - VECTOR MODE
 DISPLAY TITLE= IF300 2" SPACER DISK 90 DEG. SIDE DROP ANALYSIS

         POST26 SUMMARY OF VARIABLE EXTREME VALUES
 VARI TYPE  IDENTIFIERS  NAME   MINIMUM     AT TIME     MAXIMUM     AT TIME

   2 DISP    82   UY    82  UY  -0.4069E-02 0.6302E-02 0.1980E-02 0.2624E-01
   3 DISP   112   UY   112  UY  -0.1374E-01 0.1246E-02 0.1008E-01 0.2682E-01
   4 ESTR    39   45    39  SI    3.129     0.2500E-04 0.3067E+03 0.6302E-02
   5 ESTR   129   40   129  SI    0.4903E-05 0.2500E-04 0.2236E+03 0.2012E-02
   6 ESTR    89   30    89  SI    0.3077E-02 0.2500E-04 0.3068E+03 0.1534E-01
   7 ESTR   165   35   165  SI    0.3552E-04 0.2500E-04 0.3969E+03 0.2165E-02
   8 ESTR   163   45   163  SI    0.1097E-02 0.2500E-04 0.2406E+03 0.6302E-02
   9 ESTR     7   35     7  SI    0.1965E-01 0.2500E-04 0.5128E+03 0.1859E-02
  10 ESTR     7   40     7  SI    0.2084E-01 0.2500E-04 0.5625E+03 0.1859E-02

 ***** ROUTINE COMPLETED *****  CP =     22829.010
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
/PREP7
/TITLE,IP300 2" SPACER DISK 45 DEG. SIDE DROP ANALYSIS
ET,1,42,,,3
ET,2,21,,,4
ET,3,12,,,1
KAN,4
KAY,5,2
GAMMA,0.02,20
DENS,1,0.00073
NUXY,1,0.29
EX,1,28.2E6
C*** REAL CONSTANTS
R,1,2.0
R,2,0.00886
R,3,0.01771
R,101,0.0,1.0E11,-0.028,3.0
R,102,2.98,1.0E11,-0.024,3.0
R,103,5.97,1.0E11,-0.021,3.0
R,104,8.95,1.0E11,-0.018,3.0
R,105,11.94,1.0E11,-0.015,3.0
R,106,14.92,1.0E11,-0.013,3.0
R,107,17.92,1.0E11,-0.010,3.0
R,108,20.90,1.0E11,-0.008,3.0
R,109,23.88,1.0E11,-0.006,3.0
R,110,26.87,1.0E11,-0.005,3.0
R,111,29.85,1.0E11,-0.003,3.0
R,112,32.84,1.0E11,-0.002,3.0
R,113,35.83,1.0E11,-0.001,3.0
R,119,53.77,1.0E11,-0.001,3.0
R,120,56.76,1.0E11,-0.002,3.0
R,121,59.76,1.0E11,-0.003,3.0
R,122,62.74,1.0E11,-0.005,3.0
R,123,65.73,1.0E11,-0.006,3.0
R,124,68.73,1.0E11,-0.008,3.0
R,125,71.72,1.0E11,-0.010,3.0
R,126,74.71,1.0E11,-0.013,3.0
R,127,77.72,1.0E11,-0.015,3.0
R,128,80.71,1.0E11,-0.018,3.0
R,129,83.71,1.0E11,-0.021,3.0
R,130,86.71,1.0E11,-0.024,3.0
R,131,90.00,1.0E11,-0.028,3.0
C*** NODE GENERATION
CSYS,1
N,1,18.655,-90
N,31,18.655,0
FILL
NGEN,2,31,1,31,1,-0.49
NDELE,39
CSYS,0
N,63,0,-17
N,64,0.4,-17
N,70,6.4,-17
FILL
N,71,0,-16
N,72,.4,-16
N,73,6.4,-16
N,74,7.2,-16
NGEN,2,5,71,74,1,,1.0
N,80,8.2,-15
N,81,9.2,-15
```

********** ANSYS INPUT DATA LISTING (FILE16) **********

```
 61   NGEN,2,6,76,81,1,,1.0
 62   N,88,10.2,-14
 63   NGEN,2,7,82,88,1,,1.0
 64   N,96,11.2,-13
 65   N,97,12.2,-13
 66   NGEN,2,9,89,97,1,,1.0
 67   N,107,13.2,-12
 68   N,108,0,-11
 69   N,109,.4,-11
 70   N,115,6.4,-11
 71   FILL
 72   N,116,7.2,-11
 73   N,122,13.2,-11
 74   FILL
 75   NGEN,2,15,108,115,1,,.375
 76   N,131,6.8,-10.625
 77   NGEN,2,9,123,131,1,,.375
 78   N,141,7.2,-10.25
 79   N,147,13.2,-10.25
 80   FILL
 81   N,148,13.6,-10.25
 82   N,149,14.6,-10.25
 83   N,150,0,-9.25
 84   N,151,.4,-9.25
 85   N,152,6.4,-9.25
 86   N,153,6.8,-9.25
 87   N,154,7.2,-9.25
 88   N,155,13.2,-9.25
 89   N,156,13.6,-9.25
 90   N,157,14.6,-9.25
 91   NGEN,2,8,150,157,1,,1.0
 92   N,166,13.6,-8.25
 93   NGEN,2,9,158,166,1,,1.0
 94   NGEN,2,9,167,175,1,,1.0
 95   N,185,16.6,-6.25
 96   NGEN,2,10,176,185,1,,1.0
 97   NGEN,2,64,132,148,1,,6.0
 98   N,215,16.6,-4.25
 99   FILL,212,215
100   N,216,0,-3.625
101   N,219,3,-3.625
102   FILL
103   N,220,3.8,-3.625
104   N,226,9.8,-3.625
105   FILL
106   N,227,10.6,-3.625
107   N,233,16.6,-3.625
108   FILL
109   NGEN,2,18,216,219,1,,0.625
110   N,238,3.4,-3.0
111   N,239,3.8,-3.0
112   N,245,9.8,-3.0
113   FILL
114   N,246,10.2,-3.0
115   N,247,10.6,-3.0
116   N,253,16.6,-3.0
117   FILL
118   NGEN,2,17,237,239,1,,1.0
119   NGEN,2,12,245,247,1,,1.0
120   N,260,16.6,-2
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
121   NGEN,3,7,254,260,1,,1.0
122   C*** ELEMENT GENERATION
123   E,1,2,33,32
124   EGEN,6,1,-1
125   E,7,8,70,38
126   E,8,9,40,70
127   E,9,10,41,40
128   EGEN,22,1,-1
129   E,32,64,63
130   E,32,33,64
131   E,33,34,65,64
132   EGEN,5,1,-1
133   E,38,70,69
134   E,63,64,72,71
135   E,70,40,74,73
136   E,40,41,74
137   E,71,72,77,76
138   E,73,74,79,78
139   E,74,41,80,79
140   E,41,42,81,80
141   E,42,43,81
142   E,76,77,83,82
143   E,78,79,85,84
144   E,79,80,86,85
145   E,80,81,87,86
146   E,81,43,44
147   E,81,44,88
148   E,81,88,87
149   E,82,83,90,89
150   E,84,85,92,91
151   EGEN,4,1,-1
152   E,88,45,96,93
153   E,44,45,88
154   E,45,46,96
155   E,46,97,96
156   E,46,47,97
157   E,89,90,99,98
158   E,91,92,101,100
159   EGEN,6,1,-1
160   E,97,47,106
161   E,47,107,106
162   E,47,48,107
163   E,98,99,109,108
164   E,100,101,116,115
165   EGEN,7,1,-1
166   E,48,49,107
167   E,107,49,122
168   E,49,50,122
169   E,108,109,124,123
170   EGEN,7,1,-1
171   E,115,131,130
172   E,115,116,131
173   E,123,124,133,132
174   EGEN,7,1,-1
175   E,130,131,140,139
176   E,131,116,141
177   E,131,141,140
178   E,116,117,142,141
179   EGEN,6,1,-1
180   E,122,148,147
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
181   E,122,50,148
182   E,148,50,149
183   E,50,51,149
184   E,132,133,151,150
185   E,139,140,153,152
186   E,140,141,154,153
187   E,147,148,156,155
188   E,148,149,157,156
189   E,149,51,157
190   E,51,52,157
191   E,150,151,159,158
192   E,152,153,161,160
193   E,153,154,162,161
194   E,155,156,164,163
195   E,156,157,165,164
196   E,157,52,166,165
197   E,52,53,166
198   E,158,159,168,167
199   E,160,161,170,169
200   E,161,162,171,170
201   E,163,164,173,172
202   E,164,165,174,173
203   E,165,166,175,174
204   E,166,53,54,175
205   E,167,168,177,176
206   E,169,170,179,178
207   E,170,171,180,179
208   E,172,173,182,181
209   EGEN,3,1,-1
210   E,175,54,185,184
211   E,54,55,185
212   E,176,177,187,186
213   E,178,179,189,188
214   E,179,180,190,189
215   E,181,182,192,191
216   EGEN,4,1,-1
217   E,55,56,185
218   E,185,56,195
219   E,186,187,197,196
220   E,188,189,204,203
221   E,189,190,205,204
222   E,191,192,212,211
223   EGEN,4,1,-1
224   E,195,56,57
225   E,195,57,215
226   E,215,57,58
227   E,196,197,216
228   E,197,198,217,216
229   EGEN,3,1,-1
230   E,200,220,219
231   E,200,201,221,220
232   EGEN,3,1,-1
233   E,203,204,223
234   E,204,205,223
235   E,205,206,224,223
236   EGEN,3,1,-1
237   E,208,227,226
238   E,208,209,228,227
239   EGEN,3,1,-1
240   E,211,212,230
```

********** ANSYS INPUT DATA LISTING (FILE16) **********

```
241   E,212,213,231,230
242   EGEN,3,1,-1
243   E,215,58,233
244   E,216,217,235,234
245   EGEN,3,1,-1
246   E,219,238,237
247   E,219,220,238
248   E,220,239,238
249   E,220,221,240,239
250   EGEN,6,1,-1
251   E,226,246,245
252   E,226,227,246
253   E,227,247,246
254   E,227,228,248,247
255   EGEN,6,1,-1
256   E,233,58,59,253
257   E,237,238,255,254
258   E,238,239,256,255
259   E,245,246,258,257
260   E,246,247,259,258
261   E,253,59,60,260
262   E,254,255,262,261
263   E,255,256,263,262
264   E,257,258,265,264
265   E,258,259,266,265
266   E,260,60,61,267
267   E,261,262,269,268
268   E,262,263,270,269
269   E,264,265,272,271
270   E,265,266,273,272
271   E,267,61,62,274
272   C*** SYMMETRIC GENERATION
273   SYMM,1,1000,1,500
274   SYMM,2,2000,1,2000
275   ESYM,2,1000,1,500
276   ESYM,2,2000,1,2000
277   MERGE
278   C*** BOUNDARY NODES
279   NGEN,2,4000,1,31,1
280   CSYS,0
281   C*** MASS ELEMENTS
282   TYPE,2
283   REAL,2
284   E,64
285   E,70
286   E,133
287   E,139
288   E,141
289   E,147
290   E,234
291   E,237
292   E,239
293   E,245
294   E,247
295   E,253
296   E,1064
297   E,1070
298   E,1133
299   E,1139
300   E,1141
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
E,1147
E,1237
E,1239
E,1245
E,1247
E,1253
E,3211
E,3207
E,3205
E,3197
E,3203
E,2197
E,2203
E,2205
E,2211
E,3115
E,3109
E,2109
E,2115
E,115
E,1109
E,203
E,211
E,1197
E,1205
E,2253
E,2245
E,2237
E,3239
E,3247
E,2147
E,2139
E,3133
E,3141
E,2070
E,3064
REAL,3
E,63
EGEN,5,1,-1
E,134
EGEN,5,1,-1
E,142
EGEN,5,1,-1
E,234
E,235
E,236
E,240
EGEN,5,1,-1
E,248
EGEN,5,1,-1
E,1065
EGEN,5,1,-1
E,1134
EGEN,5,1,-1
E,1142
EGEN,5,1,-1
E,1240
EGEN,5,1,-1
E,1248
EGEN,5,1,-1
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
361   E,1235
362   E,1236
363   E,2206
364   EGEN,3,1,-1
365   E,2198
366   EGEN,3,1,-1
367   E,3198
368   EGEN,3,1,-1
369   E,3206
370   EGEN,3,1,-1
371   E,2110
372   EGEN,3,1,-1
373   E,3110
374   EGEN,3,1,-1
375   E,73
376   E,78
377   E,84
378   E,91
379   E,100
380   E,1072
381   E,1077
382   E,1083
383   E,1090
384   E,1099
385   E,155
386   E,163
387   E,172
388   E,181
389   E,191
390   E,152
391   E,160
392   E,169
393   E,178
394   E,188
395   E,1151
396   E,1159
397   E,1168
398   E,1177
399   E,1187
400   E,1154
401   E,1162
402   E,1171
403   E,1180
404   E,1190
405   E,260
406   E,267
407   E,274
408   E,2267
409   E,2260
410   E,257
411   E,264
412   E,271
413   E,2264
414   E,2257
415   E,254
416   E,261
417   E,268
418   E,2261
419   E,2254
420   E,1259
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
421   E,1266
422   E,1273
423   E,3266
424   E,3259
425   E,1256
426   E,1263
427   E,1270
428   E,3263
429   E,3256
430   E,2191
431   E,2181
432   E,2172
433   E,2163
434   E,2155
435   E,2188
436   E,2178
437   E,2169
438   E,2160
439   E,2152
440   E,3190
441   E,3180
442   E,3171
443   E,3162
444   E,3154
445   E,3187
446   E,3177
447   E,3168
448   E,3159
449   E,3151
450   E,2100
451   E,2091
452   E,2084
453   E,2078
454   E,2073
455   E,3099
456   E,3090
457   E,3083
458   E,3077
459   E,3072
460   C*** GAP ELEMENTS
461   TYPE,3
462   REAL,101
463   E,4001,1
464   REAL,102
465   E,4002,2
466   REAL,103
467   E,4003,3
468   REAL,104
469   E,4004,4
470   REAL,105
471   E,4005,5
472   REAL,106
473   E,4006,6
474   REAL,107
475   E,4007,7
476   REAL,108
477   E,4008,8
478   REAL,109
479   E,4009,9
480   REAL,110
```

********** ANSYS INPUT DATA LISTING (FILE8) **********

```
481   E,4010,10
482   REAL,111
483   E,4011,11
484   REAL,112
485   E,4012,12
486   REAL,113
487   E,4013,13
488   REAL,119
489   E,4019,19
490   REAL,120
491   E,4020,20
492   REAL,121
493   E,4021,21
494   REAL,122
495   E,4022,22
496   REAL,123
497   E,4023,23
498   REAL,124
499   E,4024,24
500   REAL,125
501   E,4025,25
502   REAL,126
503   E,4026,26
504   REAL,127
505   E,4027,27
506   REAL,128
507   E,4028,28
508   REAL,129
509   E,4029,29
510   REAL,130
511   E,4030,30
512   REAL,131
513   E,4031,31
514   WSORT,Y
515   C*** BOUNDARY CONDITIONS
516   D,16,ALL,0.0
517   CSYS,1
518   NROTATE,14,18
519   D,14,UX,0.0
520   D,15,UX,0.0
521   D,17,UX,0.0
522   D,18,UX,0.0
523   CSYS,0
524   D,4001,ALL,0.0,,4013,1
525   D,4019,ALL,0.0,,4031,1
526   C*** LOADING CONDITIONS
527   TIME,0.6E-3
528   ITER,12,,1
529   ACEL,-31105,31105
530   LWRITE
531   TIME,0.95E-3
532   ITER,7,,1
533   ACEL,-13795,13795
534   LWRITE
535   TIME,1OE-3
536   ITER,50,0,1
537   LWRITE
538   TIME,26.1E-3
539   ITER,25,,1
540   ACEL,0.0,0
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
LWRITE
TIME,.03
ITER,20,,1
LWRITE
AFWRITE
FINISH
/EXEC
/INPUT,27
FINISH
/POST26
NUMVAR,15
DISP,2,273,UY
DISP,3,171,UY
DISP,4,83,UY
ESTL,5,201,30,SI
ESTL,6,201,45,SI
ESTL,7,100,30,SI
ESTL,8,219,40,SI
ESTL,9,217,40,SI
ESTL,10,436,40,SI
ESTL,11,438,40,SI
ESTL,12,130,40,SI
ESTL,13,128,40,SI
ESTL,14,349,40,SI
ESTL,15,47,40,SI
/SHOW,PLOTS,,1
PLVAR,2,3,4
PLVAR,5,6,7
PLVAR,8,9,10,11
PLVAR,12,13,14,15
FINISH
/POST1
SET,,,,,0.158E-1
PLNSTR,SI
PRNSTR,ALL
SET,,,,,0.4027E-2
PLNSTR,SI
PRNSTR,ALL
FINISH
/EOF
```

```
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 IP300 2" SPACER DISK 45 DEG. SIDE DROP ANALYSIS                          21.4713  MAR 26,1990 CP=  24495.890

        ***** GENERAL GRAPH POSTPROCESSOR (POST26) *****

 ALL POST26 SPECIFICATIONS ARE RESET TO INITIAL DEFAULTS

 MAXIMUM NUMBER OF VARIABLES= 15

 VARIABLE  2 IS   273 UY

 VARIABLE  3 IS   171 UY

 VARIABLE  4 IS    83 UY

 VARIABLE  5  IS ELEMENT   201  ITEM  30  NAME= 201  SI

 VARIABLE  6  IS ELEMENT   201  ITEM  45  NAME= 201  SI

 VARIABLE  7  IS ELEMENT   100  ITEM  30  NAME= 100  SI

 VARIABLE  8  IS ELEMENT   219  ITEM  40  NAME= 219  SI

 VARIABLE  9  IS ELEMENT   217  ITEM  40  NAME= 217  SI

 VARIABLE 10  IS ELEMENT   436  ITEM  40  NAME= 436  SI

 VARIABLE 11  IS ELEMENT   438  ITEM  40  NAME= 438  SI

 VARIABLE 12  IS ELEMENT   130  ITEM  40  NAME= 130  SI

 VARIABLE 13  IS ELEMENT   128  ITEM  40  NAME= 128  SI

 VARIABLE 14  IS ELEMENT   349  ITEM  40  NAME= 349  SI

 VARIABLE 15  IS ELEMENT    47  ITEM  40  NAME= 47   SI

 /SHOW SWITCH PLOTS TO FILE PLOTS              - VECTOR MODE

 STORAGE COMPLETE FOR    114 DATA POINTS

         SUMMARY OF VARIABLES STORED THIS STEP AND EXTREME VALUES
 VARI TYPE  IDENTIFIERS  NAME    MINIMUM     AT TIME      MAXIMUM    AT TIME

   2 DISP   273  UY     273 UY   -0.9417E-02 0.1580E-01 0.8233E-02 0.1451E-01
   3 DISP   171  UY     171 UY   -0.9110E-02 0.5656E-02 0.5819E-02 0.2981E-01
   4 DISP    83  UY      83 UY   -0.3371E-01 0.4389E-02 0.3621E-01 0.2961E-01
   5 ESTR   201  30     201 SI     0.1338    0.5000E-04 0.1230E+05 0.4027E-02
   6 ESTR   201  45     201 SI     0.1327    0.5000E-04 0.2500E+05 0.1580E-01
   7 ESTR   100  30     100 SI     1.922     0.5000E-04 0.1293E+05 0.1312E-02
   8 ESTR   219  40     219 SI     0.2316E-03 0.5000E-04 0.1566E+05 0.6018E-02
   9 ESTR   217  40     217 SI     0.5141E-05 0.5000E-04 0.2362E+05 0.5837E-02
  10 ESTR   436  40     436 SI     0.1271E-06 0.5000E-04 0.4062E+05 0.4932E-02
  11 ESTR   438  40     438 SI     0.6943E-07 0.5000E-04 0.1474E+05 0.1258E-01
  12 ESTR   130  40     130 SI     0.1960    0.5000E-04 0.2161E+05 0.1580E-01
  13 ESTR   128  40     128 SI     0.3567E-03 0.5000E-04 0.2463E+05 0.5113E-02
  14 ESTR   349  40     349 SI     0.1372E-04 0.5000E-04 0.1473E+05 0.6923E-02
  15 ESTR    47  40     47  SI     0.1572E-01 0.5000E-04 0.4344E+05 0.4389E-02

 PLOT DEFINITION
 CURVE  VARIABLE   NAME
    1        2    273 UY
    2        3    171 UY
    3        4    83  UY

 CUMULATIVE DISPLAY NUMBER   1 WRITTEN TO FILE PLOTS          - VECTOR MODE
 DISPLAY TITLE= IP300 2" SPACER DISK 45 DEG. SIDE DROP ANALYSIS

 PLOT DEFINITION
 CURVE  VARIABLE   NAME
    1        5    201 SI
    2        6    201 SI
    3        7    100 SI

 CUMULATIVE DISPLAY NUMBER   2 WRITTEN TO FILE PLOTS          - VECTOR MODE
 DISPLAY TITLE= IP300 2" SPACER DISK 45 DEG. SIDE DROP ANALYSIS

 PLOT DEFINITION
 CURVE  VARIABLE   NAME
    1        8    219 SI
    2        9    217 SI
    3       10    436 SI
    4       11    438 SI

 CUMULATIVE DISPLAY NUMBER   3 WRITTEN TO FILE PLOTS          - VECTOR MODE
 DISPLAY TITLE= IP300 2" SPACER DISK 45 DEG. SIDE DROP ANALYSIS

 PLOT DEFINITION
 CURVE  VARIABLE   NAME
    1       12    130 SI
    2       13    128 SI
    3       14    349 SI
    4       15    47  SI

 CUMULATIVE DISPLAY NUMBER   4 WRITTEN TO FILE PLOTS          - VECTOR MODE
 DISPLAY TITLE= IP300 2" SPACER DISK 45 DEG. SIDE DROP ANALYSIS

 ***** ROUTINE COMPLETED *****  CP =     24890.090
```

********** ANSYS INPUT DATA LISTING (FILE16) **********

```
/PREP7
/TITLE,IF300 3/4" SPACER DISK SIDE DROP ANALYSIS
ET,1,42,,,3
ET,2,21,,,4
ET,3,12,,,1
KAN,4
KAY,5,2
GAMMA,0.02,20
DENS,1,0.00073
MUXY,1,0.29
EX,1,26.2E6
C*** REAL CONSTANTS
R,1,0.75
R,2,0.0105
R,3,0.0055
R,4,0.0075
R,5,0.0064
R,104,8.95,1.0E11,-0.080,3.0
R,105,11.94,1.0E11,-0.075,3.0
R,106,14.92,1.0E11,-0.070,3.0
R,107,17.92,1.0E11,-0.065,3.0
R,108,20.90,1.0E11,-0.061,3.0
R,109,23.88,1.0E11,-0.056,3.0
R,110,26.87,1.0E11,-0.052,3.0
R,111,29.85,1.0E11,-0.047,3.0
R,112,32.84,1.0E11,-0.043,3.0
R,113,35.83,1.0E11,-0.039,3.0
R,114,38.82,1.0E11,-0.035,3.0
R,115,41.81,1.0E11,-0.031,3.0
R,116,44.79,1.0E11,-0.028,3.0
R,117,47.78,1.0E11,-0.024,3.0
R,118,50.77,1.0E11,-0.021,3.0
R,119,53.77,1.0E11,-0.018,3.0
R,120,56.76,1.0E11,-0.015,3.0
R,121,59.76,1.0E11,-0.013,3.0
R,122,62.74,1.0E11,-0.010,3.0
R,123,65.73,1.0E11,-0.008,3.0
R,124,68.73,1.0E11,-0.006,3.0
R,125,71.72,1.0E11,-0.005,3.0
R,126,74.71,1.0E11,-0.003,3.0
R,127,77.72,1.0E11,-0.002,3.0
R,128,80.71,1.0E11,-0.001,3.0
C*** NODE GENERATION
CSYS,1
N,1,18.635,-90
N,31,18.635,0
FILL
NGEN,2,31,1,31,1,,-0.49
NDELE,39
CSYS,0
N,63,0,-17
N,64,0.4,-17
N,70,6.4,-17
FILL
N,71,0,-16
N,72,.4,-16
N,73,6.4,-16
N,74,7.2,-16
NGEN,2,5,71,74,1,,1.0
N,80,8.2,-15
```

********** ANSYS INPUT DATA LISTING (FILE16) **********

```
  61  N,81,9.2,-13
  62  NGEN,2,6,76,81,1,,1.0
  63  N,88,10.2,-14
  64  NGEN,2,7,82,88,1,,1.0
  65  N,96,11.2,-13
  66  N,97,12.2,-13
  67  NGEN,2,9,89,97,1,,1.0
  68  N,107,13.2,-12
  69  N,108,0,-11
  70  N,109,.4,-11
  71  N,115,6.4,-11
  72  FILL
  73  N,116,7.2,-11
  74  N,122,13.2,-11
  75  FILL
  76  NGEN,2,15,108,115,1,,.375
  77  N,131,6.8,-10.625
  78  NGEN,2,9,123,131,1,,.375
  79  N,141,7.2,-10.25
  80  N,147,13.2,-10.25
  81  FILL
  82  N,148,13.6,-10.25
  83  N,149,14.6,-10.25
  84  N,150,0,-9.25
  85  N,151,.4,-9.25
  86  N,152,6.4,-9.25
  87  N,153,6.8,-9.25
  88  N,154,7.2,-9.25
  89  N,155,13.2,-9.25
  90  N,156,13.6,-9.25
  91  N,157,14.6,-9.25
  92  NGEN,2,8,150,157,1,,1.0
  93  N,166,13.6,-8.25
  94  NGEN,2,9,158,166,1,,1.0
  95  NGEN,2,9,167,175,1,,1.0
  96  N,183,16.6,-6.25
  97  NGEN,2,10,176,185,1,,1.0
  98  NGEN,2,64,132,148,1,,6.0
  99  N,215,16.6,-4.25
 100  FILL,212,215
 101  N,216,0,-3.625
 102  N,219,3,-3.625
 103  FILL
 104  N,220,3.8,-3.625
 105  N,226,9.8,-3.625
 106  FILL
 107  N,227,10.6,-3.625
 108  N,233,16.6,-3.625
 109  FILL
 110  NGEN,2,18,216,219,1,,0.625
 111  N,238,3.4,-3.0
 112  N,239,3.8,-3.0
 113  N,245,9.8,-3.0
 114  FILL
 115  N,246,10.2,-3.0
 116  N,247,10.6,-3.0
 117  N,253,16.6,-3.0
 118  FILL
 119  NGEN,2,17,237,239,1,,1.0
 120  NGEN,2,12,245,247,1,,1.0
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
N,260,16.6,-2
NGEN,3,7,254,260,1,,1.0
C*** ELEMENT GENERATION
E,1,2,33,32
EGEN,6,1,-1
E,7,8,70,38
E,8,9,40,70
E,9,10,41,40
EGEN,22,1,-1
E,32,64,63
E,32,33,64
E,33,34,65,64
EGEN,5,1,-1
E,38,70,69
E,63,64,72,71
E,70,40,74,73
E,40,41,74
E,71,72,77,76
E,73,74,79,78
E,74,41,80,79
E,41,42,81,80
E,42,43,81
E,76,77,83,82
E,78,79,85,84
E,79,80,86,85
E,80,81,87,86
E,81,43,44
E,81,44,88
E,81,88,87
E,82,83,90,89
E,84,85,92,91
EGEN,4,1,-1
E,88,45,96,95
E,44,45,88
E,45,46,96
E,46,97,96
E,46,47,97
E,89,90,99,98
E,91,92,101,100
EGEN,6,1,-1
E,97,47,106
E,47,107,106
E,47,48,107
E,98,99,109,108
E,100,101,116,115
EGEN,7,1,-1
E,48,49,107
E,107,49,122
E,49,50,122
E,108,109,124,123
EGEN,7,1,-1
E,115,131,130
E,115,116,131
E,123,124,133,132
EGEN,7,1,-1
E,130,131,140,139
E,131,116,141
E,131,141,140
E,116,117,142,141
EGEN,6,1,-1
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
E,122,148,147
E,122,50,148
E,148,50,149
E,50,51,149
E,132,133,151,150
E,139,140,153,152
E,140,141,154,153
E,147,148,156,155
E,148,149,157,156
E,149,51,157
E,51,52,157
E,150,151,159,158
E,152,153,161,160
E,153,154,162,161
E,155,156,164,163
E,156,157,165,164
E,157,52,166,165
E,52,53,166
E,158,159,168,167
E,160,161,170,169
E,161,162,171,170
E,163,164,173,172
E,164,165,174,173
E,165,166,175,174
E,166,53,54,175
E,167,168,177,176
E,169,170,179,178
E,170,171,180,179
E,172,173,182,181
EGEN,3,1,-1
E,173,54,185,184
E,54,55,185
E,176,177,187,186
E,178,179,189,188
E,179,180,190,189
E,181,182,192,191
EGEN,4,1,-1
E,55,56,185
E,185,56,195
E,186,187,197,196
E,188,189,204,203
E,189,190,205,204
E,191,192,212,211
EGEN,4,1,-1
E,193,56,57
E,195,57,215
E,215,57,58
E,196,197,216
E,197,198,217,216
EGEN,3,1,-1
E,200,220,219
E,200,201,221,220
EGEN,3,1,-1
E,203,204,223
E,204,205,223
E,205,206,224,223
EGEN,3,1,-1
E,208,227,226
E,208,209,228,227
EGEN,3,1,-1
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
241   E,211,212,230
242   E,212,213,231,230
243   EGEN,3,1,-1
244   E,215,58,233
245   E,216,217,235,234
246   EGEN,3,1,-1
247   E,219,238,237
248   E,219,220,238
249   E,220,239,238
250   E,220,221,240,239
251   EGEN,6,1,-1
252   E,226,246,245
253   E,226,227,246
254   E,227,247,246
255   E,227,228,248,247
256   EGEN,6,1,-1
257   E,233,58,59,253
258   E,237,238,255,254
259   E,238,239,256,255
260   E,245,246,258,257
261   E,246,247,259,258
262   E,253,59,60,260
263   E,254,255,262,261
264   E,255,256,263,262
265   E,257,258,265,264
266   E,258,259,266,265
267   E,260,60,61,267
268   E,261,262,269,268
269   E,262,263,270,269
270   E,264,265,272,271
271   E,265,266,273,272
272   E,267,61,62,274
273   C*** SYMMETRIC GENERATION
274   SYMM,1,1000,1,500
275   ESYM,2,1000,1,500
276   MERGE
277   C*** BOUNDARY NODES
278   NGEN,2,2000,4,28,1
279   CSYS,0
280   C*** MASS ELEMENTS
281   TYPE,2
282   REAL,2
283   E,185
284   E,195
285   E,215
286   E,233
287   E,253
288   E,267
289   E,274
290   E,1185
291   E,1195
292   E,1215
293   E,1233
294   E,1253
295   E,1267
296   E,1274
297   REAL,3
298   E,63
299   EGEN,6,1,-1
300   E,1064
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
EGEN,7,1,-1
REAL,4
E,40
EGEN,5,1,-1
E,1040
EGEN,5,1,-1
REAL,5
E,45
EGEN,11,1,-1
E,1045
EGEN,11,1,-1
C*** GAP ELEMENTS
TYPE,3
REAL,104
E,2004,4
REAL,105
E,2005,5
REAL,106
E,2006,6
REAL,107
E,2007,7
REAL,108
E,2008,8
REAL,109
E,2009,9
REAL,110
E,2010,10
REAL,111
E,2011,11
REAL,112
E,2012,12
REAL,113
E,2013,13
REAL,114
E,2014,14
REAL,115
E,2015,15
REAL,116
E,2016,16
REAL,117
E,2017,17
REAL,118
E,2018,18
REAL,119
E,2019,19
REAL,120
E,2020,20
REAL,121
E,2021,21
REAL,122
E,2022,22
REAL,123
E,2023,23
REAL,124
E,2024,24
REAL,125
E,2025,25
REAL,126
E,2026,26
REAL,127
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
E,2027,27
REAL,128
E,2028,28
WSORT,Y
C*** BOUNDARY CONDITIONS
SYMBC,0,2,0
D,31,ALL,0.0
CSYS,1
NROTATE,29,30
D,29,UX,0.0
D,30,UX,0.0
CSYS,0
D,93,UZ,0.0
D,94,UZ,0.0
D,95,UZ,0.0
D,102,UZ,0.0
D,103,UZ,0.0
D,104,UZ,0.0
D,117,UZ,0.0
D,118,UZ,0.0
D,119,UZ,0.0
D,1093,UZ,0.0
D,1094,UZ,0.0
D,1095,UZ,0.0
D,1102,UZ,0.0
D,1103,UZ,0.0
D,1104,UZ,0.0
D,1117,UZ,0.0
D,1118,UZ,0.0
D,1119,UZ,0.0
D,2004,ALL,0.0,,2028,1
C*** LOADING CONDITIONS
TIME,0.6E-3
ITER,12,,1
ACEL,-82689.6
LWRITE
TIME,0.95E-3
ITER,7,,1
ACEL,-37094.4
LWRITE
TIME,10E-3
ITER,50,0,1
LWRITE
TIME,19.4E-3
ITER,25,,1
ACEL,0.0,0
LWRITE
TIME,.03
ITER,20,,1
LWRITE
AFWRITE
FINISH
/EXEC
/INPUT,27
FINISH
/POST26
TIME,0,0.03
DISP,2,273,UY
DISP,3,171,UY
ESTR,4,219,40,SI
```

********** ANSYS INPUT DATA LISTING (FILE10) **********

```
421   ESTR,5,178,45,SI
422   ESTR,6,177,45,SI
423   ESTR,7,176,45,SI
424   ESTR,8,130,40,SI
425   ESTR,9,100,45,SI
426   /SHOW,PLOTS
427   PLVAR,2,3
428   PLVAR,4,8,9
429   PLVAR,5,6,7
430   EXTREM,2,9,1
431   FINISH
432   /EOF
```

```
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IF300 3/4" SPACER DISK SIDE DROP ANALYSIS                                    16.1285  MAR 29,1990 CP=  10318.740

        ***** GENERAL GRAPH POSTPROCESSOR (POST26) *****

ALL POST26 SPECIFICATIONS ARE RESET TO INITIAL DEFAULTS

MINIMUM TIME= 0.00000E+00   MAXIMUM TIME= 0.30000E-01

*** NOTE ***
REDEFINITION OF TIME RANGE ERASES ALL PREVIOUSLY STORED OR CALCULATED DATA

VARIABLE  2 IS   273 UY

VARIABLE  3 IS   171 UY

VARIABLE  4  IS ELEMENT   219  ITEM  40  NAME= 219  SI

VARIABLE  5  IS ELEMENT   178  ITEM  45  NAME= 178  SI

VARIABLE  6  IS ELEMENT   177  ITEM  45  NAME= 177  SI

VARIABLE  7  IS ELEMENT   176  ITEM  45  NAME= 176  SI

VARIABLE  8  IS ELEMENT   130  ITEM  40  NAME= 130  SI

VARIABLE  9  IS ELEMENT   100  ITEM  45  NAME= 100  SI

/SHOW SWITCH PLOTS TO FILE PLOTS            - RASTER MODE.

STORAGE COMPLETE FOR    114 DATA POINTS

        SUMMARY OF VARIABLES STORED THIS STEP AND EXTREME VALUES
VARI TYPE  IDENTIFIERS  NAME   MINIMUM     AT TIME      MAXIMUM     AT TIME

  2 DISP   273  UY     273 UY   0.0000E+00 0.3000E-01 0.0000E+00 0.3000E-01
  3 DISP   171  UY     171 UY  -0.2258E-02 0.1312E-02 0.1166E-02 0.5475E-02
  4 ESTR   219  40     219 SI   0.1534     0.5000E-04  7228.     0.3846E-02
  5 ESTR   178  45     178 SI   0.8871     0.5000E-04 0.1923E+05 0.4027E-02
  6 ESTR   177  45     177 SI   0.5392     0.5000E-04 0.1708E+05 0.1312E-02
  7 ESTR   176  45     176 SI   0.4725     0.5000E-04 0.1855E+05 0.1312E-02
  8 ESTR   130  40     130 SI   0.3768E-01 0.5000E-04  7282.     0.1131E-02
  9 ESTR   100  45     100 SI   0.2250E-01 0.5000E-04 0.1956E+05 0.1312E-02

PLOT DEFINITION
CURVE  VARIABLE   NAME
   1        2   273 UY
   2        3   171 UY

CUMULATIVE DISPLAY NUMBER   1 WRITTEN TO FILE PLOTS            - RASTER MODE.
DISPLAY TITLE= IF300 3/4" SPACER DISK SIDE DROP ANALYSIS

PLOT DEFINITION
CURVE  VARIABLE   NAME
   1        4   219 SI
   2        8   130 SI
   3        9   100 SI

CUMULATIVE DISPLAY NUMBER   2 WRITTEN TO FILE PLOTS            - RASTER MODE.
DISPLAY TITLE= IF300 3/4" SPACER DISK SIDE DROP ANALYSIS

PLOT DEFINITION
CURVE  VARIABLE   NAME
   1        5   178 SI
   2        6   177 SI
   3        7   176 SI

CUMULATIVE DISPLAY NUMBER   3 WRITTEN TO FILE PLOTS            - RASTER MODE.
DISPLAY TITLE= IF300 3/4" SPACER DISK SIDE DROP ANALYSIS

        POST26 SUMMARY OF VARIABLE EXTREME VALUES
VARI TYPE  IDENTIFIERS  NAME   MINIMUM     AT TIME      MAXIMUM     AT TIME

  2 DISP   273  UY     273 UY   0.0000E+00 0.3000E-01 0.0000E+00 0.3000E-01
  3 DISP   171  UY     171 UY  -0.2258E-02 0.1312E-02 0.1166E-02 0.5475E-02
  4 ESTR   219  40     219 SI   0.1534     0.5000E-04  7228.     0.3846E-02
  5 ESTR   178  45     178 SI   0.8871     0.5000E-04 0.1923E+05 0.4027E-02
  6 ESTR   177  45     177 SI   0.5392     0.5000E-04 0.1708E+05 0.1312E-02
  7 ESTR   176  45     176 SI   0.4725     0.5000E-04 0.1855E+05 0.1312E-02
  8 ESTR   130  40     130 SI   0.3768E-01 0.5000E-04  7282.     0.1131E-02
  9 ESTR   100  45     100 SI   0.2250E-01 0.5000E-04 0.1956E+05 0.1312E-02

***** ROUTINE COMPLETED *****  CP =     10306.690

/EOF ENCOUNTERED ON FILE16

PREP7 AFWRITE OR SFWRITE WARNING MESSAGES =   1
NUMBER OF SOLUTION PHASE WARNING MESSAGES =   0

***** RUN COMPLETED *****  CP=    10307.1900   TIME=   16.1806
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
/PREP7
/TITLE,LF300 2" SPACER DISK 1 FOUT SIDE DROP ANALYSIS
ET,1,42,,,3
ET,2,21,,,4
ET,3,12,,,1
KAN,4
KAY,5,2
GAMMA,0.02,20
DENS,1,0.00073
NUXY,1,0.29
EX,1,26.2E6
C*** REAL CONSTANTS
R,1,2.0
R,2,0.01771
R,3,0.03541
R,104,8.93,1.0E11,-0.080,3.0
R,105,11.94,1.0E11,-0.075,3.0
R,106,14.92,1.0E11,-0.070,3.0
R,107,17.92,1.0E11,-0.065,3.0
R,108,20.90,1.0E11,-0.061,3.0
R,109,23.88,1.0E11,-0.056,3.0
R,110,26.87,1.0E11,-0.052,3.0
R,111,29.85,1.0E11,-0.047,3.0
R,112,32.84,1.0E11,-0.043,3.0
R,113,35.83,1.0E11,-0.039,3.0
R,114,38.82,1.0E11,-0.035,3.0
R,115,41.81,1.0E11,-0.031,3.0
R,116,44.79,1.0E11,-0.028,3.0
R,117,47.78,1.0E11,-0.024,3.0
R,118,50.77,1.0E11,-0.021,3.0
R,119,53.77,1.0E11,-0.018,3.0
R,120,56.76,1.0E11,-0.015,3.0
R,121,59.76,1.0E11,-0.013,3.0
R,122,62.76,1.0E11,-0.010,3.0
R,123,65.75,1.0E11,-0.008,3.0
R,124,68.75,1.0E11,-0.006,3.0
R,125,71.72,1.0E11,-0.005,3.0
R,126,74.71,1.0E11,-0.003,3.0
R,127,77.72,1.0E11,-0.002,3.0
R,128,80.71,1.0E11,-0.001,3.0
C*** NODE GENERATION
CSYS,1
N,1,18.655,-90
N,31,18.655,0
FILL
NGEN,2,31,1,31,1,-0.49
NDELE,39
CSYS,0
N,63,0,-17
N,64,0.4,-17
N,70,6.4,-17
FILL
N,71,0,-16
N,72,.4,-16
N,73,6.4,-16
N,74,7.2,-16
NGEN,2,5,71,74,1,,1.0
N,80,8.2,-15
N,81,9.2,-15
NGEN,2,6,76,81,1,,1.0
```

********** ANSYS INPUT DATA LISTING (FILE16) **********

```
  61  N,88,10.2,-14
  62  NGEN,2,7,82,88,1,,1.0
  63  N,96,11.2,-13
  64  N,97,12.2,-13
  65  NGEN,2,9,89,97,1,,1.0
  66  N,107,13.2,-12
  67  N,108,0,-11
  68  N,109,.4,-11
  69  N,115,6.4,-11
  70  FILL
  71  N,116,7.2,-11
  72  N,122,13.2,-11
  73  FILL
  74  NGEN,2,15,108,115,1,,.375
  75  N,131,6.8,-10.625
  76  NGEN,2,9,123,131,1,,.375
  77  N,141,7.2,-10.25
  78  N,147,13.2,-10.25
  79  FILL
  80  N,148,13.6,-10.25
  81  N,149,14.6,-10.25
  82  N,150,0,-9.25
  83  N,151,.4,-9.25
  84  N,152,6.4,-9.25
  85  N,153,6.8,-9.25
  86  N,154,7.2,-9.25
  87  N,155,13.2,-9.25
  88  N,156,13.6,-9.25
  89  N,157,14.6,-9.25
  90  NGEN,2,8,150,157,1,,1.0
  91  N,166,15.6,-8.25
  92  NGEN,2,9,158,166,1,,1.0
  93  NGEN,2,9,167,175,1,,1.0
  94  N,183,16.6,-6.25
  95  NGEN,2,10,176,183,1,,1.0
  96  NGEN,2,64,132,148,1,,6.0
  97  N,213,16.6,-4.25
  98  FILL,212,213
  99  N,216,0,-3.625
 100  N,219,3,-3.625
 101  FILL
 102  N,220,3.8,-3.625
 103  N,226,9.8,-3.625
 104  FILL
 105  N,227,10.6,-3.625
 106  N,233,16.6,-3.625
 107  FILL
 108  NGEN,2,18,216,219,1,,0.625
 109  N,238,3.4,-3.0
 110  N,239,3.8,-3.0
 111  N,245,9.8,-3.0
 112  FILL
 113  N,246,10.2,-3.0
 114  N,247,10.6,-3.0
 115  N,253,16.6,-3.0
 116  FILL
 117  NGEN,2,17,237,239,1,,1.0
 118  NGEN,2,12,245,247,1,,1.0
 119  N,260,16.6,-2
 120  NGEN,3,7,254,260,1,,1.0
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
121   C*** ELEMENT GENERATION
122   E,1,2,33,32
123   EGEN,6,1,-1
124   E,7,8,70,38
125   E,8,9,40,70
126   E,9,10,41,40
127   EGEN,22,1,-1
128   E,32,64,63
129   E,32,33,64
130   E,33,34,65,64
131   EGEN,5,1,-1
132   E,38,70,69
133   E,63,64,72,71
134   E,70,40,74,73
135   E,40,41,74
136   E,71,72,77,76
137   E,73,74,79,78
138   E,74,41,80,79
139   E,41,42,81,80
140   E,42,43,81
141   E,76,77,83,82
142   E,78,79,85,84
143   E,79,80,86,85
144   E,80,81,87,86
145   E,81,43,44
146   E,81,44,88
147   E,81,88,87
148   E,82,83,90,89
149   E,84,85,92,91
150   EGEN,4,1,-1
151   E,88,45,96,95
152   E,44,45,88
153   E,45,46,96
154   E,46,97,96
155   E,46,47,97
156   E,89,90,99,98
157   E,91,92,101,100
158   EGEN,6,1,-1
159   E,97,47,106
160   E,47,107,106
161   E,47,48,107
162   E,98,99,109,108
163   E,100,101,116,115
164   EGEN,7,1,-1
165   E,48,49,107
166   E,107,49,122
167   E,49,50,122
168   E,108,109,124,123
169   EGEN,7,1,-1
170   E,115,131,130
171   E,115,116,131
172   E,123,124,133,132
173   EGEN,7,1,-1
174   E,130,131,140,139
175   E,131,116,141
176   E,131,141,140
177   E,116,117,142,141
178   EGEN,6,1,-1
179   E,122,148,147
180   E,122,50,148
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
E,148,30,149
E,50,51,149
E,132,133,151,150
E,139,140,153,152
E,140,141,154,153
E,147,148,156,155
E,148,149,157,156
E,149,31,137
E,31,32,157
E,150,151,159,158
E,152,153,161,160
E,153,154,162,161
E,155,156,164,163
E,156,157,165,164
E,157,32,166,165
E,32,53,166
E,158,159,168,167
E,160,161,170,169
E,161,162,171,170
E,163,164,173,172
E,164,165,174,173
E,165,166,175,174
E,166,53,54,175
E,167,168,177,176
E,169,170,179,178
E,170,171,180,179
E,172,173,182,181
EGEN,3,1,-1
E,173,54,185,184
E,54,55,185
E,176,177,187,186
E,178,179,189,188
E,179,180,190,189
E,181,182,192,191
EGEN,4,1,-1
E,55,56,185
E,185,56,195
E,186,187,197,196
E,188,189,204,203
E,189,190,205,204
E,191,192,212,211
EGEN,4,1,-1
E,193,56,57
E,195,57,215
E,215,57,58
E,196,197,216
E,197,198,217,216
EGEN,3,1,-1
E,200,220,219
E,200,201,221,220
EGEN,3,1,-1
E,203,204,223
E,204,205,223
E,205,206,224,223
EGEN,3,1,-1
E,208,227,226
E,208,209,228,227
EGEN,3,1,-1
E,211,212,230
E,212,213,231,230
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
241   EGEN,3,1,-1
242   E,215,58,233
243   E,216,217,235,234
244   EGEN,3,1,-1
245   E,219,238,237
246   E,219,220,238
247   E,220,239,238
248   E,220,221,240,239
249   EGEN,6,1,-1
250   E,226,246,245
251   E,226,227,246
252   E,227,247,246
253   E,227,228,248,247
254   EGEN,6,1,-1
255   E,233,58,59,253
256   E,237,238,255,254
257   E,238,239,256,255
258   E,245,246,258,257
259   E,246,247,259,258
260   E,253,59,60,260
261   E,254,255,262,261
262   E,255,256,263,262
263   E,257,258,265,264
264   E,258,259,266,265
265   E,260,60,61,267
266   E,261,262,269,268
267   E,262,263,270,269
268   E,264,265,272,271
269   E,265,266,273,272
270   E,267,61,62,274
271   C*** SYMMETRIC GENERATION
272   SYMM,1,1000,1,500
273   ESYM,2,1000,1,500
274   MERGE
275   C*** BOUNDARY NODES
276   NGEN,2,2000,4,28,1
277   CSYS,0
278   C*** MASS ELEMENTS
279   TYPE,2
280   REAL,2
281   E,253
282   E,274
283   E,147
284   E,211
285   E,243
286   E,271
287   E,70
288   E,115
289   E,139
290   E,203
291   E,237
292   E,268
293   E,1247
294   E,1273
295   E,1239
296   E,1270
297   E,1141
298   E,1205
299   E,1064
300   E,1109
```

********** ANSYS INPUT DATA LISTING (FILE16) **********

```
E,1133
E,1197
REAL,3
E,260
E,267
E,257
E,264
E,254
E,261
E,155
E,163
E,172
E,181
E,191
E,152
E,160
E,169
E,178
E,188
E,73
E,78
E,84
E,91
E,100
E,1072
E,1077
E,1083
E,1090
E,1099
E,1151
E,1139
E,1168
E,1177
E,1187
E,1154
E,1162
E,1171
E,1180
E,1190
E,1266
E,1259
E,1263
E,1256
C*** GAP ELEMENTS
TYPE,3
REAL,104
E,2004,4
REAL,105
E,2005,5
REAL,106
E,2006,6
REAL,107
E,2007,7
REAL,108
E,2008,8
REAL,109
E,2009,9
REAL,110
E,2010,10
REAL,111
```

********** ANSYS INPUT DATA LISTING (FILE16) **********

```
E,2011,11
REAL,112
E,2012,12
REAL,113
E,2013,13
REAL,114
E,2014,14
REAL,115
E,2015,15
REAL,116
E,2016,16
REAL,117
E,2017,17
REAL,118
E,2018,18
REAL,119
E,2019,19
REAL,120
E,2020,20
REAL,121
E,2021,21
REAL,122
E,2022,22
REAL,123
E,2023,23
REAL,124
E,2024,24
REAL,125
E,2025,25
REAL,126
E,2026,26
REAL,127
E,2027,27
REAL,128
E,2028,28
WSORT,Y
C*** BOUNDARY CONDITIONS
SYMBC,0,2,0
D,31,ALL,0.0
CSYS,1
NROTATE,29,30
D,29,UX,0.0
D,30,UX,0.0
CSYS,0
D,93,UZ,0.0
D,94,UZ,0.0
D,95,UZ,0.0
D,102,UZ,0.0
D,103,UZ,0.0
D,104,UZ,0.0
D,117,UZ,0.0
D,118,UZ,0.0
D,119,UZ,0.0
D,1093,UZ,0.0
D,1094,UZ,0.0
D,1095,UZ,0.0
D,1102,UZ,0.0
D,1103,UZ,0.0
D,1104,UZ,0.0
D,1117,UZ,0.0
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
421   D,1118,UZ,0.0
422   D,1119,UZ,0.0
423   D,2004,ALL,0.0,,2028,1
424   C*** LOADING CONDITIONS
425   TIME,0.25E-3
426   ITER,12,,1
427   ACEL,-81144
428   LWRITE
429   TIME,0.5E-3
430   ITER,12,,1
431   ACEL,0.0
432   LWRITE
433   TIME,.02
434   ITER,30,,1
435   LWRITE
436   AFWRITE
437   FINISH
438   /EXEC
439   /INPUT,27
440   FINISH
441   /POST26
442   TIME,0,0.03
443   DISP,2,273,UY
444   DISP,3,171,UY
445   ESTR,4,219,40,SI
446   ESTR,5,178,45,SI
447   ESTR,6,177,45,SI
448   ESTR,7,176,45,SI
449   ESTR,8,130,40,SI
450   ESTR,9,100,45,SI
451   /SHOW,PLOTS,,1
452   PLVAR,2,3
453   PLVAR,4,8,9
454   PLVAR,5,6,7
455   EXTREM,2,9,1
456   FINISH
457   /EOF
```

```
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     FOR SUPPORT CALL STEVE PORTER      PHONE (206) 874-2235    TWX

IP300 2" SPACER DISK 1 FOOT SIDE DROP ANALYSIS                                21.1019  MAR 22,1990 CP=   6551.680

        ***** GENERAL GRAPH POSTPROCESSOR ( POST26) *****

ALL POST26 SPECIFICATIONS ARE RESET TO INITIAL DEFAULTS

MINIMUM TIME= 0.00000E+00   MAXIMUM TIME= 0.30000E-01

*** NOTE ***
REDEFINITION OF TIME RANGE ERASES ALL PREVIOUSLY STORED OR CALCULATED DATA

VARIABLE  2 IS   273 UY

VARIABLE  3 IS   171 UY

VARIABLE  4  IS ELEMENT   219  ITEM  40  NAME= 219  SI

VARIABLE  5  IS ELEMENT   178  ITEM  45  NAME= 178  SI

VARIABLE  6  IS ELEMENT   177  ITEM  45  NAME= 177  SI

VARIABLE  7  IS ELEMENT   176  ITEM  45  NAME= 176  SI

VARIABLE  8  IS ELEMENT   130  ITEM  40  NAME= 130  SI

VARIABLE  9  IS ELEMENT   100  ITEM  45  NAME= 100  SI

/SHOW SWITCH PLOTS TO FILE PLOTS             - VECTOR MODE

STORAGE COMPLETE FOR     74 DATA POINTS

        SUMMARY OF VARIABLES STORED THIS STEP AND EXTREME VALUES
VARI TYPE  IDENTIFIERS  NAME   MINIMUM     AT TIME     MAXIMUM     AT TIME

  2 DISP   273  UY    273 UY   0.0000E+00 0.2000E-01 0.0000E+00 0.2000E-01
  3 DISP   171  UY    171 UY  -0.1384E-02 0.1298E-01 0.1168E-02 0.1142E-01
  4 ESTR   219  40    219 SI   0.2022E-03 0.2083E-04 0.2375E+05 0.3620E-02
  5 ESTR   178  45    178 SI   0.3431E-01 0.2083E-04 0.1533E+05 0.1280E-02
  6 ESTR   177  45    177 SI   0.1127E-01 0.2083E-04 0.1166E+05 0.8900E-03
  7 ESTR   176  45    176 SI   0.6358E-02 0.2083E-04 0.1147E+05 0.1280E-02
  8 ESTR   130  40    130 SI   0.1996E-03 0.2083E-04 0.1990E+05 0.1280E-02
  9 ESTR   100  45    100 SI   0.3668E-03 0.2083E-04  5391.      0.1670E-02

PLOT DEFINITION
CURVE  VARIABLE   NAME
   1        2   273 UY
   2        3   171 UY

CUMULATIVE DISPLAY NUMBER   1 WRITTEN TO FILE PLOTS             - VECTOR MODE
DISPLAY TITLE= IP300 2" SPACER DISK 1 FOOT SIDE DROP ANALYSIS

PLOT DEFINITION
CURVE  VARIABLE   NAME
   1        4   219 SI
   2        8   130 SI
   3        9   100 SI

CUMULATIVE DISPLAY NUMBER   2 WRITTEN TO FILE PLOTS             - VECTOR MODE
DISPLAY TITLE= IP300 2" SPACER DISK 1 FOOT SIDE DROP ANALYSIS

PLOT DEFINITION
CURVE  VARIABLE   NAME
   1        5   178 SI
   2        6   177 SI
   3        7   176 SI

CUMULATIVE DISPLAY NUMBER   3 WRITTEN TO FILE PLOTS             - VECTOR MODE
DISPLAY TITLE= IP300 2" SPACER DISK 1 FOOT SIDE DROP ANALYSIS

        POST26 SUMMARY OF VARIABLE EXTREME VALUES
VARI TYPE  IDENTIFIERS  NAME   MINIMUM     AT TIME     MAXIMUM     AT TIME

  2 DISP   273  UY    273 UY   0.0000E+00 0.2000E-01 0.0000E+00 0.2000E-01
  3 DISP   171  UY    171 UY  -0.1384E-02 0.1298E-01 0.1168E-02 0.1142E-01
  4 ESTR   219  40    219 SI   0.2022E-03 0.2083E-04 0.2375E+05 0.3620E-02
  5 ESTR   178  45    178 SI   0.3431E-01 0.2083E-04 0.1533E+05 0.1280E-02
  6 ESTR   177  45    177 SI   0.1127E-01 0.2083E-04 0.1166E+05 0.8900E-03
  7 ESTR   176  45    176 SI   0.6358E-02 0.2083E-04 0.1147E+05 0.1280E-02
  8 ESTR   130  40    130 SI   0.1996E-03 0.2083E-04 0.1990E+05 0.1280E-02
  9 ESTR   100  45    100 SI   0.3668E-03 0.2083E-04  5391.      0.1670E-02

***** ROUTINE COMPLETED *****  CP =       5679.770

/EOF ENCOUNTERED ON FILE18

PREP7 AFWRITE OR SFWRITE WARNING MESSAGES =   1
NUMBER OF SOLUTION PHASE WARNING MESSAGES =   1

***** RUN COMPLETED *****  CP=      6680.2600   TIME=   21.1376
```

```
    ********** ANSYS INPUT DATA LISTING (FILE18) **********

/OUTPUT,PS1FOOT,RES
/PREP7
/TITLE,POISON SHEET 1' DROP ANALYSIS 7/16" X 19 1/16" 0 DEG.
KAN,2
KAY,3,1
ET,1,3
ET,2,21,,,4
EX,1,25.8E6
NUXY,1,0.29
DENS,1,0.000725
GAMMA,0.0,2.20
C*** REAL CONSTANTS
R,1,0.44,0.0071,0.44
C*** NODES
N,1,0.0
N,11,19.0625,0
FILL
C*** ELEMENTS
E,1,2
EGEN,10,1,-1
ITER,1,1
C*** BOUNDARY CONDITIONS
D,1,UY,0.0
D,1,UX,0.0
D,11,UY,0.0
ITER,1,1
M,6,UY
M,11,UX
TOTAL,5
AFWRITE
FINISH
/INPUT,27
FINISH
/PREP7
RESUME
KAN,5
KAY,3
C*** INITIAL CONDITIONS AT REST
TIME,0
ACEL,,,0
LWRITE
TIME,0.25E-3
C*** LOADING STEP 1
ACEL,,,81144
ITER,20,0.1
LWRITE
C*** LOADING STEP 2
TIME,0.5E-3
ITER,20,0.1
ACEL,,,0.0
LWRITE
C*** LOADING STEP 3
TIME,1
ITER,100,0.1
LWRITE
SLOAD,1
AFWRITE
FINISH
/LNFREQ,5
/INPUT,27
FINISH
/POST26
FILE,10
DISP,2,6,UY,UY
DISP,3,11,UX,UX
EXTREM,2,3,1
/GRAPH,LABX,SEC.
/GRAPH,LABY,IN.
/TITLE,7/16" X 19 1/16" POISON SHEET 1' 0 DEG. SIDE DROP DISPLACEMENT
/SHOW,PLOT1,,1
PLVAR,2
/SHOW,PLOT2,,1
PLVAR,3
```

```
FINISH
/STRESS..5
TIME.1
NSTRES.100
END
FINISH
/POST26
ESTR.4.5.11.SB
RFORCE.5.1.FY
RFORCE.6.11.FY
/TITLE.7/16" X 19 1/16" POISON SHEET 1' SIDE DROP BENDING STRESS
/SHOW.PLOT3..1
/GRAPH.LABY.PSI
PLVAR.4
/SHOW.PLOT4..1
/TITLE.7/16" X 19 1/16" POISON SHEET 1' SIDE DROP END REACTIONS
/GRAPH.LABY.#/IN
PLVAR.5.6
FINISH
/OUTPUT
/EOF
```

```
   ********** ANSYS OUTPUT DATA LISTING **********

  *** ANSYS REV 4.4            38122-PC/LIN-4.4 CP=    9.060 ****
  FOR SUPPORT CALL ROBERT QUINN      PHONE (408) 281-6151    TWX

NEW TITLE= POISON SHEET 1' DROP ANALYSIS 7/16" X 19 1/16" 0 DEG.

VARIABLE  2 IS     6 UY

VARIABLE  3 IS    11 UX

          POST26 SUMMARY OF VARIABLE EXTREME VALUES
VARI TYPE  IDENTIFIERS  NAME   MINIMUM     AT TIME     MAXIMUM    AT TIME

  2 DISP     6  UY    6  UY   -0.3780E-01 0.2203E-01 0.3791E-01 0.7515E-02
  3 DISP    11  UX   11  UX   -0.9012E-17 0.8981E-03 0.1733E-16 0.2933E-03


VARIABLE  4  IS ELEMENT     5  ITEM  11  NAME= 5    SB

VARIABLE  5 IS REACTION FORCE     1 FY

VARIABLE  6 IS REACTION FORCE    11 FY

        SUMMARY OF VARIABLES STORED THIS STEP AND EXTREME VALUES
VARI TYPE  IDENTIFIERS  NAME   MINIMUM     AT TIME     MAXIMUM    AT TIME

  4 ESTR     5  11    5  SB    -6147.      0.2200      6394.      0.7000E-01
  5 RFOR     1  FY    1  FY    -33.70      0.5000      33.76      0.3600
  6 RFOR    11  FY   11  FY    -27.15      0.4800      27.00      0.3400

***** ROUTINE COMPLETED ***** CP =       465.880
```

********** ANSYS INPUT DATA LISTING (FILE8) **********

```
  1  /PREP7
  2  /TITLE,SPACER DISK THERMAL STRESS ANALYSIS, NORMAL CONDITIONS
  3  KAN,-1
  4  ET,1,35
  5  DENS,1,0.00073
  6  NUXY,1,0.29
  7  EX,1,26.2E6
  8  KXX,1,8.8
  9  ALPX,1,8.92E-6
 10  C*** NODE GENERATION
 11  CSYS,1
 12  N,1,18.655,-90
 13  N,31,18.655,0
 14  FILL
 15  NGEN,2,31,1,31,1,-0.49
 16  NDELE,39
 17  CSYS,0
 18  N,63,0,-17
 19  N,64,0.4,-17
 20  N,70,6.4,-17
 21  FILL
 22  N,71,0,-16
 23  N,72,.4,-16
 24  N,73,6.4,-16
 25  N,74,7.2,-16
 26  NGEN,2,5,71,74,1,,1.0
 27  N,80,8.2,-15
 28  N,81,9.2,-15
 29  NGEN,2,6,76,81,1,,1.0
 30  N,88,10.2,-14
 31  NGEN,2,7,82,88,1,,1.0
 32  N,96,11.2,-13
 33  N,97,12.2,-13
 34  NGEN,2,9,89,97,1,,1.0
 35  N,107,13.2,-12
 36  N,108,0,-11
 37  N,109,.4,-11
 38  N,113,6.4,-11
 39  FILL
 40  N,116,7.2,-11
 41  N,122,13.2,-11
 42  FILL
 43  NGEN,2,15,108,115,1,,.375
 44  N,131,6.8,-10.625
 45  NGEN,2,9,123,131,1,,.375
 46  N,141,7.2,-10.25
 47  N,147,13.2,-10.25
 48  FILL
 49  N,148,13.6,-10.25
 50  N,149,14.6,-10.25
 51  N,150,0,-9.25
 52  N,151,.4,-9.25
 53  N,152,6.4,-9.25
 54  N,153,6.8,-9.25
 55  N,154,7.2,-9.25
 56  N,155,13.2,-9.25
 57  N,156,13.6,-9.25
 58  N,157,14.6,-9.25
 59  NGEN,2,8,150,157,1,,1.0
 60  N,166,15.6,-8.25
```

********** ANSYS INPUT DATA LISTING (FILE16) **********

```
  61  NGEN,2,9,156,166,1,,1.0
  62  NGEN,2,9,167,175,1,,1.0
  63  N,183,16.6,-6.25
  64  NGEN,2,10,176,183,1,,1.0
  65  NGEN,2,64,132,148,1,,6.0
  66  N,215,16.6,-4.25
  67  FILL,212,215
  68  N,216,0,-3.625
  69  N,219,3,-3.625
  70  FILL
  71  N,220,3.8,-3.625
  72  N,226,9.8,-3.625
  73  FILL
  74  N,227,10.6,-3.625
  75  N,233,16.6,-3.625
  76  FILL
  77  NGEN,2,18,216,219,1,,0.625
  78  N,238,3.4,-3.0
  79  N,239,3.8,-3.0
  80  N,245,9.8,-3.0
  81  FILL
  82  N,246,10.2,-3.0
  83  N,247,10.6,-3.0
  84  N,253,16.6,-3.0
  85  FILL
  86  NGEN,2,17,237,239,1,,1.0
  87  NGEN,2,12,243,247,1,,1.0
  88  N,260,16.6,-2
  89  NGEN,3,7,254,260,1,,1.0
  90  C*** ELEMENT GENERATION
  91  E,1,2,33,32
  92  EGEN,6,1,-1
  93  E,7,8,70,38
  94  E,8,9,40,70
  95  E,9,10,41,40
  96  EGEN,22,1,-1
  97  E,32,64,63
  98  E,32,33,64
  99  E,33,34,65,64
 100  EGEN,5,1,-1
 101  E,38,70,69
 102  E,63,64,72,71
 103  E,70,40,74,73
 104  E,40,41,74
 105  E,71,72,77,76
 106  E,73,74,79,78
 107  E,74,41,80,79
 108  E,41,42,81,80
 109  E,42,43,81
 110  E,76,77,83,82
 111  E,78,79,85,84
 112  E,79,80,86,85
 113  E,80,81,87,86
 114  E,81,43,44
 115  E,81,44,88
 116  E,81,88,87
 117  E,82,83,90,89
 118  E,84,85,92,91
 119  EGEN,4,1,-1
 120  E,88,45,96,95
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
121   E,44,45,88
122   E,45,46,96
123   E,46,97,96
124   E,46,47,97
125   E,89,90,99,98
126   E,91,92,101,100
127   EGEN,6,1,-1
128   E,97,47,106
129   E,47,107,106
130   E,47,48,107
131   E,98,99,109,108
132   E,100,101,116,115
133   EGEN,7,1,-1
134   E,48,49,107
135   E,107,49,122
136   E,49,50,122
137   E,108,109,124,123
138   EGEN,7,1,-1
139   E,115,131,130
140   E,115,116,131
141   E,123,124,133,132
142   EGEN,7,1,-1
143   E,130,131,140,139
144   E,131,116,141
145   E,131,141,140
146   E,116,117,142,141
147   EGEN,6,1,-1
148   E,122,148,147
149   E,122,50,148
150   E,148,50,149
151   E,50,51,149
152   E,132,133,151,150
153   E,139,140,153,152
154   E,140,141,154,153
155   E,147,148,156,155
156   E,148,149,157,156
157   E,149,51,157
158   E,51,52,157
159   E,150,151,159,158
160   E,152,153,161,160
161   E,153,154,162,161
162   E,155,156,164,163
163   E,156,157,165,164
164   E,157,52,166,165
165   E,52,53,166
166   E,158,159,168,167
167   E,160,161,170,169
168   E,161,162,171,170
169   E,163,164,173,172
170   E,164,165,174,173
171   E,165,166,175,174
172   E,166,53,54,175
173   E,167,168,177,176
174   E,169,170,179,178
175   E,170,171,180,179
176   E,172,173,182,181
177   EGEN,3,1,-1
178   E,175,54,185,184
179   E,54,55,185
180   E,176,177,187,186
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
E,178,179,189,188
E,179,180,190,189
E,181,182,192,191
EGEN,4,1,-1
E,55,56,185
E,185,56,195
E,186,187,197,196
E,188,189,204,203
E,189,190,205,204
E,191,192,212,211
EGEN,4,1,-1
E,193,36,37
E,195,37,215
E,215,37,38
E,196,197,216
E,197,198,217,216
EGEN,3,1,-1
E,200,220,219
E,200,201,221,220
EGEN,3,1,-1
E,203,204,223
E,204,205,223
E,205,206,224,223
EGEN,3,1,-1
E,208,227,226
E,208,209,228,227
EGEN,3,1,-1
E,211,212,230
E,212,213,231,230
EGEN,3,1,-1
E,213,38,233
E,216,217,235,234
EGEN,3,1,-1
E,219,238,237
E,219,220,238
E,220,239,238
E,220,221,240,239
EGEN,6,1,-1
E,226,246,245
E,226,227,246
E,227,247,246
E,227,228,248,247
EGEN,6,1,-1
E,233,58,59,253
E,237,238,255,254
E,238,239,256,255
E,245,246,258,257
E,246,247,259,258
E,253,59,60,260
E,254,255,262,261
E,255,256,263,262
E,257,258,265,264
E,258,259,266,265
E,260,60,61,267
E,261,262,269,268
E,262,263,270,269
E,264,265,272,271
E,265,266,273,272
E,267,61,62,274
C*** NODE TEMPERATURES
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
241   NT,1,TEMP,231.0
242   NT,2,TEMP,230.8
243   NT,3,TEMP,230.6
244   NT,4,TEMP,230.4
245   NT,5,TEMP,230.2
246   NT,6,TEMP,230.0
247   NT,7,TEMP,230.0
248   NT,8,TEMP,229.9
249   NT,9,TEMP,229.9
250   NT,10,TEMP,229.9
251   NT,11,TEMP,229.9
252   NT,12,TEMP,229.9
253   NT,13,TEMP,229.9
254   NT,14,TEMP,229.9
255   NT,15,TEMP,229.9
256   NT,16,TEMP,229.9
257   NT,17,TEMP,229.9
258   NT,18,TEMP,229.9
259   NT,19,TEMP,229.9
260   NT,20,TEMP,229.9
261   NT,21,TEMP,230
262   NT,22,TEMP,230
263   NT,23,TEMP,230.1
264   NT,24,TEMP,230.2
265   NT,25,TEMP,230.3
266   NT,26,TEMP,230.4
267   NT,27,TEMP,230.5
268   NT,28,TEMP,230.5
269   NT,29,TEMP,230.5
270   NT,30,TEMP,230.5
271   NT,31,TEMP,230.5
272   NT,63,TEMP,340.8
273   NT,64,TEMP,345.2
274   NT,65,TEMP,341.3
275   NT,66,TEMP,341.1
276   NT,67,TEMP,333.7
277   NT,68,TEMP,333.2
278   NT,69,TEMP,321.9
279   NT,70,TEMP,230.1
280   NT,71,TEMP,342.9
281   NT,72,TEMP,345.6
282   NT,73,TEMP,321.9
283   NT,82,TEMP,369.8
284   NT,83,TEMP,370.1
285   NT,84,TEMP,346.3
286   NT,98,TEMP,387.8
287   NT,99,TEMP,385.1
288   NT,100,TEMP,361.1
289   NT,108,TEMP,389.7
290   NT,109,TEMP,385.3
291   NT,110,TEMP,385.3
292   NT,111,TEMP,383.5
293   NT,112,TEMP,383.0
294   NT,113,TEMP,377.1
295   NT,114,TEMP,361.6
296   NT,115,TEMP,361.1
297   NT,132,TEMP,438.7
298   NT,133,TEMP,449.3
299   NT,134,TEMP,449.3
300   NT,135,TEMP,447.6
```

********** ANSYS INPUT DATA LISTING (FILE:8) **********

```
301   NT,136,TEMP,443.9
302   NT,137,TEMP,443.7
303   NT,138,TEMP,435.7
304   NT,139,TEMP,435.2
305   NT,141,TEMP,403.3
306   NT,142,TEMP,403.0
307   NT,143,TEMP,388.9
308   NT,144,TEMP,388.2
309   NT,145,TEMP,377.1
310   NT,146,TEMP,376.4
311   NT,147,TEMP,357.4
312   NT,150,TEMP,442.6
313   NT,151,TEMP,449.6
314   NT,152,TEMP,435.8
315   NT,154,TEMP,403.5
316   NT,155,TEMP,358.2
317   NT,167,TEMP,460.6
318   NT,168,TEMP,461.0
319   NT,169,TEMP,450.2
320   NT,171,TEMP,420.0
321   NT,172,TEMP,370.0
322   NT,186,TEMP,464.6
323   NT,187,TEMP,464.9
324   NT,188,TEMP,454.7
325   NT,190,TEMP,426.0
326   NT,191,TEMP,376.0
327   NT,196,TEMP,464.5
328   NT,197,TEMP,464.9
329   NT,198,TEMP,464.9
330   NT,199,TEMP,464.0
331   NT,200,TEMP,461.5
332   NT,201,TEMP,461.3
333   NT,202,TEMP,455.0
334   NT,203,TEMP,434.5
335   NT,205,TEMP,426.3
336   NT,206,TEMP,425.9
337   NT,207,TEMP,415.6
338   NT,208,TEMP,415.0
339   NT,209,TEMP,403.2
340   NT,210,TEMP,376.6
341   NT,211,TEMP,375.5
342   NT,234,TEMP,486.6
343   NT,235,TEMP,486.5
344   NT,236,TEMP,485.3
345   NT,237,TEMP,485.1
346   NT,239,TEMP,473.5
347   NT,240,TEMP,473.3
348   NT,241,TEMP,468.9
349   NT,242,TEMP,468.7
350   NT,243,TEMP,464.1
351   NT,244,TEMP,456.1
352   NT,245,TEMP,455.5
353   NT,247,TEMP,419.8
354   NT,248,TEMP,419.3
355   NT,249,TEMP,404.3
356   NT,250,TEMP,403.6
357   NT,251,TEMP,387.5
358   NT,252,TEMP,371.3
359   NT,253,TEMP,371.1
360   NT,254,TEMP,486.5
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
361   MT,256,TEMP,474.9
362   MT,257,TEMP,458.4
363   MT,259,TEMP,422.3
364   MT,260,TEMP,371.2
365   MT,261,TEMP,487.2
366   MT,263,TEMP,475.7
367   MT,264,TEMP,460.0
368   MT,266,TEMP,423.8
369   MT,267,TEMP,371.8
370   MT,268,TEMP,487.4
371   MT,270,TEMP,476.0
372   MT,271,TEMP,460.5
373   MT,273,TEMP,424.4
374   MT,274,TEMP,372.0
375   ITER,-20,,20
376   AFWRITE
377   FINI
378   /INPUT,27
379   FINI
380   /PREP7
381   RESUME
382   KAN,0
383   ET,2,42,,,3
384   R,1,2.0
385   TREF,70
386   KTEMP,1,20
387   REAL,1
388   TYPE,2
389   EMODIF,ALL,0
390   SYMBC,,0,0
391   SYMBC,,2,0
392   D,234,UZ,0.0
393   ITER,1,,1
394   AFWRITE
395   FINI
396   /INPUT,27
397   FINI
398   /POST1
399   SET,1,1
400   PLNSTR,SI
401   PRDISP
402   /SHOW,PLOTS,,1
403   PLNSTR,TEMP
404   PLNSTR,SI
405   FINI
406   /EOF
```

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SPACER DISK THERMAL STRESS ANALYSIS, NORMAL CONDITIONS 10.2773 MAY 1,1990 CP= 263.370

***** POST1 NODAL STRESS LISTING *****

LOAD STEP 1 ITERATION= 1 SECTION= 1
TIME= 0.00000E+00 LOAD CASE= 1

THE FOLLOWING X,Y,Z STRESSES ARE IN GLOBAL COORDINATES

NODE	SX	SY	SZ	SXY	SYZ	SXZ	SIG1	SIG2	SIG3	SI	SIGE
1	0.4274E+05	-19.78	0.0000E+00	904.1	0.0000E+00	0.0000E+00	0.4276E+05	0.0000E+00	-38.89	0.4279E+05	0.4277E+05
2	0.4107E+05	-858.0	0.0000E+00	2360.	0.0000E+00	0.0000E+00	0.4126E+05	0.0000E+00	-1046.	0.4230E+05	0.4179E+05
3	0.3761E+05	-166.9	0.0000E+00	4891.	0.0000E+00	0.0000E+00	0.3828E+05	0.0000E+00	-633.8	0.3912E+05	0.3871E+05
4	0.3324E+05	1071.	0.0000E+00	6114.	0.0000E+00	0.0000E+00	0.3438E+05	298.5	-364.9	0.3474E+05	0.3442E+05
5	0.2861E+05	789.4	0.0000E+00	6808.	0.0000E+00	0.0000E+00	0.3021E+05	0.0000E+00	-808.2	0.3101E+05	0.3063E+05
6	0.2369E+05	3079.	0.0000E+00	6740.	0.0000E+00	0.0000E+00	0.2755E+05	1218.	0.0000E+00	0.2755E+05	0.2696E+05
7	0.2248E+05	2966.	0.0000E+00	5997.	0.0000E+00	0.0000E+00	0.2418E+05	3260.	-1992.	0.2617E+05	0.2407E+05
8	0.2023E+05	-725.2	0.0000E+00	8444.	0.0000E+00	0.0000E+00	0.2326E+05	0.0000E+00	-3749.	0.2701E+05	0.2534E+05
9	0.2934E+05	6229.	0.0000E+00	0.1356E+05	0.0000E+00	0.0000E+00	0.3394E+05	638.5	-817.6	0.3676E+05	0.3606E+05
10	0.2251E+05	7363.	0.0000E+00	0.1309E+05	0.0000E+00	0.0000E+00	0.3008E+05	84.06	-286.9	0.3036E+05	0.3018E+05
11	0.1673E+05	6391.	0.0000E+00	0.1055E+05	0.0000E+00	0.0000E+00	0.2337E+05	172.0	-222.4	0.2359E+05	0.2339E+05
12	0.1371E+05	6195.	0.0000E+00	9477.	0.0000E+00	0.0000E+00	0.2016E+05	0.0000E+00	-252.6	0.2041E+05	0.2029E+05
13	0.1185E+05	6578.	0.0000E+00	9020.	0.0000E+00	0.0000E+00	0.1862E+05	21.22	-214.2	0.1883E+05	0.1872E+05
14	0.1060E+05	7046.	0.0000E+00	8778.	0.0000E+00	0.0000E+00	0.1779E+05	1.947	-140.7	0.1793E+05	0.1786E+05
15	9998.	7636.	0.0000E+00	8577.	0.0000E+00	0.0000E+00	0.1797E+05	0.0000E+00	-133.0	0.1810E+05	0.1803E+05
16	9420.	8041.	0.0000E+00	9582.	0.0000E+00	0.0000E+00	0.1883E+05	0.0000E+00	-369.7	0.1920E+05	0.1902E+05
17	9128.	0.1072E+05	0.0000E+00	9952.	0.0000E+00	0.0000E+00	0.1992E+05	9.580	-73.13	0.1999E+05	0.1995E+05
18	8403.	0.1239E+05	0.0000E+00	0.1048E+05	0.0000E+00	0.0000E+00	0.2108E+05	0.0000E+00	-291.7	0.2138E+05	0.2123E+05
19	7086.	0.1404E+05	0.0000E+00	0.1035E+05	0.0000E+00	0.0000E+00	0.2152E+05	0.0000E+00	-378.8	0.2189E+05	0.2171E+05
20	5937.	0.1473E+05	0.0000E+00	9444.	0.0000E+00	0.0000E+00	0.2076E+05	54.48	-147.4	0.2091E+05	0.2081E+05
21	4651.	0.1488E+05	0.0000E+00	8749.	0.0000E+00	0.0000E+00	0.1991E+05	0.0000E+00	-382.3	0.2030E+05	0.2011E+05
22	4054.	0.1574E+05	0.0000E+00	8154.	0.0000E+00	0.0000E+00	0.1994E+05	0.0000E+00	-142.3	0.2008E+05	0.2001E+05
23	3335.	0.1694E+05	0.0000E+00	7884.	0.0000E+00	0.0000E+00	0.2056E+05	0.0000E+00	-287.9	0.2085E+05	0.2071E+05
24	2883.	0.1871E+05	0.0000E+00	7620.	0.0000E+00	0.0000E+00	0.2179E+05	0.0000E+00	-197.6	0.2199E+05	0.2189E+05
25	2375.	0.2135E+05	0.0000E+00	7655.	0.0000E+00	0.0000E+00	0.2406E+05	0.0000E+00	-340.0	0.2440E+05	0.2423E+05
26	2261.	0.2593E+05	0.0000E+00	7978.	0.0000E+00	0.0000E+00	0.2838E+05	0.0000E+00	-207.6	0.2859E+05	0.2849E+05
27	1035.	0.3116E+05	0.0000E+00	7411.	0.0000E+00	0.0000E+00	0.3293E+05	0.0000E+00	-739.5	0.3369E+05	0.3333E+05
28	-176.7	0.3198E+05	0.0000E+00	4829.	0.0000E+00	0.0000E+00	0.3274E+05	0.0000E+00	-937.5	0.3368E+05	0.3322E+05
29	-147.5	0.3016E+05	0.0000E+00	2331.	0.0000E+00	0.0000E+00	0.3037E+05	137.8	-491.7	0.3086E+05	0.3055E+05
30	206.1	0.2679E+05	0.0000E+00	877.9	0.0000E+00	0.0000E+00	0.2682E+05	177.1	-2.888	0.2683E+05	0.2674E+05
31	-384.5	0.2527E+05	0.0000E+00	567.0	0.0000E+00	0.0000E+00	0.2528E+05	0.0000E+00	-397.1	0.2568E+05	0.2548E+05
32	0.2169E+05	5437.	0.0000E+00	1411.	0.0000E+00	0.0000E+00	0.2190E+05	5234.	0.0000E+00	0.2190E+05	0.2027E+05
33	0.2573E+05	817.4	0.0000E+00	3097.	0.0000E+00	0.0000E+00	0.2623E+05	1811.	-1498.	0.2773E+05	0.2634E+05
34	0.2466E+05	190.9	0.0000E+00	3623.	0.0000E+00	0.0000E+00	0.2521E+05	192.1	-387.3	0.2560E+05	0.2542E+05
35	0.2200E+05	833.1	0.0000E+00	4067.	0.0000E+00	0.0000E+00	0.2277E+05	461.8	-391.0	0.2316E+05	0.2275E+05
36	0.2127E+05	602.0	0.0000E+00	4513.	0.0000E+00	0.0000E+00	0.2224E+05	542.7	-911.0	0.2313E+05	0.2248E+05
37	0.2285E+05	1796.	0.0000E+00	4947.	0.0000E+00	0.0000E+00	0.2402E+05	1462.	-831.2	0.2485E+05	0.2381E+05
38	0.3288E+05	-1035.	0.0000E+00	7062.	0.0000E+00	0.0000E+00	0.3473E+05	0.0000E+00	-2887.	0.3762E+05	0.3630E+05
40	0.1693E+05	550.1	0.0000E+00	0.1017E+05	0.0000E+00	0.0000E+00	0.2220E+05	0.0000E+00	-4720.	0.2692E+05	0.2310E+05
41	0.1399E+05	6939.	0.0000E+00	8573.	0.0000E+00	0.0000E+00	0.1976E+05	1340.	-172.1	0.1993E+05	0.1923E+05
42	0.1299E+05	5537.	0.0000E+00	8823.	0.0000E+00	0.0000E+00	0.1887E+05	456.1	-798.5	0.1967E+05	0.1908E+05
43	0.1193E+05	6536.	0.0000E+00	8146.	0.0000E+00	0.0000E+00	0.1783E+05	742.9	-107.1	0.1794E+05	0.1753E+05
44	0.1119E+05	7486.	0.0000E+00	7500.	0.0000E+00	0.0000E+00	0.1708E+05	1662.	-62.37	0.1714E+05	0.1640E+05

SPACER DISK THERMAL STRESS ANALYSIS, NORMAL CONDITIONS 10.2776 MAY 1,1990 CP= 264.190

***** POST1 NODAL STRESS LISTING *****

LOAD STEP 1 ITERATION= 1 SECTION= 1
TIME= 0.00000E+00 LOAD CASE= 1

THE FOLLOWING X,Y,Z STRESSES ARE IN GLOBAL COORDINATES

NODE	SX	SY	SZ	SXY	SYZ	SXZ	SIG1	SIG2	SIG3	SI	SIGE
45	9948.	7217.	0.0000E+00	6846.	0.0000E+00	0.0000E+00	0.1537E+05	1626.	-28.71	0.1560E+05	0.1492E+05
46	0.1048E+05	8238.	0.0000E+00	7185.	0.0000E+00	0.0000E+00	0.1664E+05	2143.	-64.04	0.1670E+05	0.1578E+05
47	0.1020E+05	9662.	0.0000E+00	7268.	0.0000E+00	0.0000E+00	0.1724E+05	2733.	-103.9	0.1734E+05	0.1622E+05
48	8306.	9137.	0.0000E+00	8054.	0.0000E+00	0.0000E+00	0.1680E+05	773.3	-126.5	0.1692E+05	0.1650E+05
49	9231.	0.1121E+05	0.0000E+00	7799.	0.0000E+00	0.0000E+00	0.1812E+05	2547.	-226.9	0.1835E+05	0.1730E+05
50	0.1002E+05	0.1408E+05	0.0000E+00	7205.	0.0000E+00	0.0000E+00	0.1964E+05	4664.	-206.7	0.1985E+05	0.1817E+05
51	6757.	0.1339E+05	0.0000E+00	6911.	0.0000E+00	0.0000E+00	0.1775E+05	2491.	-84.58	0.1783E+05	0.1677E+05
52	4885.	0.1294E+05	0.0000E+00	6612.	0.0000E+00	0.0000E+00	0.1667E+05	1238.	-85.26	0.1675E+05	0.1621E+05
53	3155.	0.1312E+05	0.0000E+00	6837.	0.0000E+00	0.0000E+00	0.1661E+05	421.1	-758.3	0.1737E+05	0.1685E+05
54	3438.	0.1452E+05	0.0000E+00	6384.	0.0000E+00	0.0000E+00	0.1744E+05	614.3	-97.86	0.1754E+05	0.1720E+05
55	3484.	0.1603E+05	0.0000E+00	6674.	0.0000E+00	0.0000E+00	0.1893E+05	698.8	-113.7	0.1904E+05	0.1865E+05
56	4429.	0.1775E+05	0.0000E+00	6699.	0.0000E+00	0.0000E+00	0.2057E+05	1760.	-153.8	0.2073E+05	0.1988E+05
57	5692.	0.1963E+05	0.0000E+00	6299.	0.0000E+00	0.0000E+00	0.2211E+05	3369.	-158.3	0.2227E+05	0.2084E+05
58	1680.	0.2026E+05	0.0000E+00	5241.	0.0000E+00	0.0000E+00	0.2181E+05	2024.	-1893.	0.2370E+05	0.2211E+05
59	-2208.	0.2426E+05	0.0000E+00	2608.	0.0000E+00	0.0000E+00	0.2468E+05	0.0000E+00	-2627.	0.2731E+05	0.2618E+05
60	147.1	0.2167E+05	0.0000E+00	788.6	0.0000E+00	0.0000E+00	0.2173E+05	420.9	-333.8	0.2206E+05	0.2170E+05
61	24.22	0.2025E+05	0.0000E+00	273.2	0.0000E+00	0.0000E+00	0.2026E+05	164.9	-147.0	0.2040E+05	0.2025E+05
62	-227.3	0.2001E+05	0.0000E+00	203.2	0.0000E+00	0.0000E+00	0.2002E+05	0.0000E+00	-231.8	0.2025E+05	0.2014E+05
63	-9987.	-0.1441E+05	0.0000E+00	647.9	0.0000E+00	0.0000E+00	0.0000E+00	-9859.	-0.1453E+05	0.1453E+05	0.1292E+05
64	-0.1051E+05	-0.1422E+05	0.0000E+00	2182.	0.0000E+00	0.0000E+00	0.0000E+00	-6331.	-0.1839E+05	0.1839E+05	0.1697E+05
65	-0.1348E+05	420.7	0.0000E+00	1895.	0.0000E+00	0.0000E+00	845.3	-146.6	-0.1376E+05	0.1460E+05	0.1414E+05
66	-5568.	-497.2	0.0000E+00	1833.	0.0000E+00	0.0000E+00	549.3	-52.14	-6562.	7112.	6835.
67	2771.	17.31	0.0000E+00	2011.	0.0000E+00	0.0000E+00	4843.	0.0000E+00	-2034.	6897.	6141.
68	0.1358E+05	-582.3	0.0000E+00	3071.	0.0000E+00	0.0000E+00	0.1429E+05	504.4	-1794.	0.1608E+05	0.1507E+05
69	0.2977E+05	-5751.	0.0000E+00	3332.	0.0000E+00	0.0000E+00	0.3015E+05	2163.	-8298.	0.3843E+05	0.3456E+05
70	0.4139E+05	6887.	0.0000E+00	9351.	0.0000E+00	0.0000E+00	0.4439E+05	4616.	-727.9	0.4512E+05	0.4281E+05
71	2264.	-0.1372E+05	0.0000E+00	136.0	0.0000E+00	0.0000E+00	2284.	0.0000E+00	-0.1374E+05	0.1502E+05	0.1402E+05
72	2127.	-0.1354E+05	0.0000E+00	136.0	0.0000E+00	0.0000E+00	2145.	0.0000E+00	-0.1355E+05	0.1570E+05	0.1474E+05
73	-6970.	-0.2013E+05	0.0000E+00	2904.	0.0000E+00	0.0000E+00	0.0000E+00	-5579.	-0.2152E+05	0.2152E+05	0.1942E+05
74	4587.	2064.	0.0000E+00	4797.	0.0000E+00	0.0000E+00	8959.	357.6	-2665.	0.1161E+05	0.1049E+05
76	-498.4	-0.1348E+05	0.0000E+00	-66.94	0.0000E+00	0.0000E+00	0.0000E+00	-490.1	-0.1349E+05	0.1349E+05	0.1325E+05
77	-142.3	-0.1277E+05	0.0000E+00	-66.94	0.0000E+00	0.0000E+00	0.0000E+00	-133.6	-0.1278E+05	0.1278E+05	0.1271E+05
78	4589.	-0.1511E+05	0.0000E+00	-448.0	0.0000E+00	0.0000E+00	4604.	0.0000E+00	-0.1512E+05	0.1973E+05	0.1788E+05
79	173.9	-5220.	0.0000E+00	1268.	0.0000E+00	0.0000E+00	2043.	-796.0	-6293.	8336.	7671.
80	2867.	2631.	0.0000E+00	4324.	0.0000E+00	0.0000E+00	7129.	233.5	-1866.	8995.	8171.
81	6679.	4633.	0.0000E+00	6662.	0.0000E+00	0.0000E+00	0.1245E+05	604.3	-1736.	0.1418E+05	0.1323E+05
82	-107.3	-0.1286E+05	0.0000E+00	12.37	0.0000E+00	0.0000E+00	0.0000E+00	-102.6	-0.1287E+05	0.1287E+05	0.1282E+05
83	-167.6	-0.1339E+05	0.0000E+00	12.37	0.0000E+00	0.0000E+00	0.0000E+00	-163.1	-0.1339E+05	0.1339E+05	0.1331E+05
84	-2677.	-0.1696E+05	0.0000E+00	-622.2	0.0000E+00	0.0000E+00	0.0000E+00	-2650.	-0.1698E+05	0.1698E+05	0.1583E+05
85	1031.	-6033.	0.0000E+00	-211.6	0.0000E+00	0.0000E+00	1173.	-88.80	-6086.	7258.	6747.
86	1176.	148.8	0.0000E+00	1538.	0.0000E+00	0.0000E+00	2703.	0.0000E+00	-1379.	4082.	3697.
87	2382.	2091.	0.0000E+00	3762.	0.0000E+00	0.0000E+00	6031.	178.0	-1736.	7767.	7112.
88	4544.	2715.	0.0000E+00	5824.	0.0000E+00	0.0000E+00	9532.	80.24	-2334.	0.1189E+05	0.1102E+05

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SPACER DISK THERMAL STRESS ANALYSIS, NORMAL CONDITIONS 10.2777 MAY 1,1990 CP= 264.790

***** POST1 NODAL STRESS LISTING *****

LOAD STEP 1 ITERATION= 1 SECTION= 1
TIME= 0.00000E+00 LOAD CASE= 1

THE FOLLOWING X,Y,Z STRESSES ARE IN GLOBAL COORDINATES

NODE	SX	SY	SZ	SXY	SYZ	SXZ	SIG1	SIG2	SIG3	SI	SIGE
89	426.5	-0.1337E+05	0.0000E+00	70.65	0.0000E+00	0.0000E+00	433.4	0.0000E+00	-0.1338E+05	0.1381E+05	0.1360E+05
90	141.7	-0.1288E+05	0.0000E+00	70.65	0.0000E+00	0.0000E+00	149.2	0.0000E+00	-0.1289E+05	0.1303E+05	0.1296E+05
91	1412.	-0.1100E+05	0.0000E+00	-441.4	0.0000E+00	0.0000E+00	1428.	0.0000E+00	-0.1102E+05	0.1244E+05	0.1181E+05
92	-725.7	-8801.	0.0000E+00	-286.7	0.0000E+00	0.0000E+00	119.0	-828.1	-8816.	8937.	8524.
93	84.03	-1990.	0.0000E+00	447.2	0.0000E+00	0.0000E+00	483.3	-119.1	-2270.	2753.	2534.
94	802.3	1642.	0.0000E+00	1823.	0.0000E+00	0.0000E+00	3168.	0.0000E+00	-724.3	3893.	3588.
95	3252.	3403.	0.0000E+00	3514.	0.0000E+00	0.0000E+00	6896.	76.23	-317.6	7214.	7038.
96	2809.	1107.	0.0000E+00	5489.	0.0000E+00	0.0000E+00	7523.	169.2	-3776.	0.1130E+05	0.1010E+05
97	7005.	5372.	0.0000E+00	6413.	0.0000E+00	0.0000E+00	0.1269E+05	412.5	-725.8	0.1341E+05	0.1289E+05
98	-336.0	-0.1297E+05	0.0000E+00	-131.9	0.0000E+00	0.0000E+00	0.0000E+00	-311.1	-0.1299E+05	0.1299E+05	0.1284E+05
99	-210.0	-0.1326E+05	0.0000E+00	-131.9	0.0000E+00	0.0000E+00	2.259	-190.4	-0.1330E+05	0.1331E+05	0.1321E+05
100	-1769.	-0.1396E+05	0.0000E+00	571.7	0.0000E+00	0.0000E+00	0.0000E+00	-1679.	-0.1403E+05	0.1403E+05	0.1331E+05
101	-353.6	-7323.	0.0000E+00	562.1	0.0000E+00	0.0000E+00	552.9	-783.6	-7444.	7997.	7444.
102	-2083.	-2594.	0.0000E+00	428.9	0.0000E+00	0.0000E+00	0.0000E+00	-1786.	-2891.	2891.	2597.
103	-1378.	671.0	0.0000E+00	478.1	0.0000E+00	0.0000E+00	909.4	0.0000E+00	-1817.	2726.	2445.
104	-198.9	1434.	0.0000E+00	1283.	0.0000E+00	0.0000E+00	2363.	0.0000E+00	-1128.	3492.	3127.
105	2097.	2249.	0.0000E+00	2866.	0.0000E+00	0.0000E+00	5119.	34.68	-807.3	5926.	5357.
106	1396.	591.2	0.0000E+00	5211.	0.0000E+00	0.0000E+00	6244.	96.98	-4334.	0.1060E+05	9644.
107	5429.	5793.	0.0000E+00	6783.	0.0000E+00	0.0000E+00	0.1243E+05	473.3	-1698.	0.1413E+05	0.1324E+05
108	-39.02	-0.1146E+05	0.0000E+00	-1307.	0.0000E+00	0.0000E+00	415.4	-275.8	-0.1164E+05	0.1203E+05	0.1172E+05
109	1341.	-8782.	0.0000E+00	-1004.	0.0000E+00	0.0000E+00	1813.	-93.23	-8962.	0.1078E+05	0.1008E+05
110	3648.	1213.	0.0000E+00	153.0	0.0000E+00	0.0000E+00	3772.	1089.	0.0000E+00	3772.	3371.
111	1925.	-14.29	0.0000E+00	352.9	0.0000E+00	0.0000E+00	1994.	0.0000E+00	-82.77	2077.	2043.
112	-1105.	-217.4	0.0000E+00	284.7	0.0000E+00	0.0000E+00	21.63	-113.8	-1228.	1250.	1191.
113	-2830.	-406.3	0.0000E+00	204.8	0.0000E+00	0.0000E+00	130.1	-449.6	-2907.	3027.	2793.
114	-5034.	2193.	0.0000E+00	440.4	0.0000E+00	0.0000E+00	2252.	0.0000E+00	-5083.	7344.	6382.
115	-1108.	-5617.	0.0000E+00	1117.	0.0000E+00	0.0000E+00	1281.	-1951.	-6034.	7335.	6815.
116	-3577.	-8371.	0.0000E+00	1868.	0.0000E+00	0.0000E+00	244.2	-3174.	-9218.	9462.	8380.
117	-4263.	-324.1	0.0000E+00	709.3	0.0000E+00	0.0000E+00	892.1	-1004.	-4675.	5567.	4916.
118	-4844.	-77.64	0.0000E+00	-313.3	0.0000E+00	0.0000E+00	294.8	-332.9	-4884.	5179.	4907.
119	-3348.	739.7	0.0000E+00	55.41	0.0000E+00	0.0000E+00	804.0	0.0000E+00	-3413.	4217.	3904.
120	-2651.	521.2	0.0000E+00	1006.	0.0000E+00	0.0000E+00	1086.	-106.6	-3109.	4193.	3863.
121	6.418	1469.	0.0000E+00	2638.	0.0000E+00	0.0000E+00	3628.	0.0000E+00	-2152.	3780.	3089.
122	-616.9	1368.	0.0000E+00	4826.	0.0000E+00	0.0000E+00	5376.	1090.	-5715.	0.1109E+05	0.1011E+05
123	-7136.	-0.1096E+05	0.0000E+00	-228.6	0.0000E+00	0.0000E+00	0.0000E+00	-6472.	-0.1162E+05	0.1162E+05	0.1009E+05
124	-7618.	-5911.	0.0000E+00	27.32	0.0000E+00	0.0000E+00	0.0000E+00	-5189.	-8340.	8340.	7356.
125	-9669.	1377.	0.0000E+00	283.3	0.0000E+00	0.0000E+00	1414.	0.0000E+00	-9707.	0.1112E+05	0.1049E+05
126	-0.1012E+05	-126.9	0.0000E+00	283.3	0.0000E+00	0.0000E+00	69.68	-176.5	-0.1014E+05	0.1021E+05	0.1009E+05
127	-9613.	-140.8	0.0000E+00	283.3	0.0000E+00	0.0000E+00	49.46	-173.2	-9630.	9680.	9571.
128	-0.1001E+05	9.265	0.0000E+00	283.3	0.0000E+00	0.0000E+00	66.72	-36.48	-0.1003E+05	0.1010E+05	0.1003E+05
129	-9865.	1202.	0.0000E+00	283.3	0.0000E+00	0.0000E+00	1246.	0.0000E+00	-9909.	0.1116E+05	0.1059E+05
130	-7415.	-7190.	0.0000E+00	-316.3	0.0000E+00	0.0000E+00	0.0000E+00	-3644.	-8961.	8961.	8069.
131	-6515.	-0.1184E+05	0.0000E+00	942.4	0.0000E+00	0.0000E+00	0.0000E+00	-3631.	-0.1252E+05	0.1252E+05	0.1117E+05

SPACER DISK THERMAL STRESS ANALYSIS, NORMAL CONDITIONS 10.2779 MAY 1,1990 CP= 265.400

***** POST1 NODAL STRESS LISTING *****

LOAD STEP 1 ITERATION= 1 SECTION= 1
TIME= 0.00000E+00 LOAD CASE= 1

THE FOLLOWING X,Y,Z STRESSES ARE IN GLOBAL COORDINATES

NODE	SX	SY	SZ	SXY	SYZ	SXZ	SIG1	SIG2	SIG3	SI	SIGE
132	-8311.	-0.1030E+05	0.0000E+00	1262.	0.0000E+00	0.0000E+00	0.0000E+00	-7686.	-0.1093E+05	0.1093E+05	9764.
133	-0.1494E+05	-9826.	0.0000E+00	1162.	0.0000E+00	0.0000E+00	0.0000E+00	-7349.	-0.1741E+05	0.1741E+05	0.1533E+05
134	-0.2368E+05	1646.	0.0000E+00	413.5	0.0000E+00	0.0000E+00	1663.	0.0000E+00	-0.2370E+05	0.2536E+05	0.2457E+05
135	-0.2105E+05	-259.6	0.0000E+00	213.6	0.0000E+00	0.0000E+00	0.0000E+00	-251.4	-0.2106E+05	0.2106E+05	0.2094E+05
136	-0.1904E+05	151.8	0.0000E+00	281.9	0.0000E+00	0.0000E+00	203.2	-46.36	-0.1905E+05	0.1925E+05	0.1913E+05
137	-0.1652E+05	-231.2	0.0000E+00	361.7	0.0000E+00	0.0000E+00	86.11	-299.5	-0.1654E+05	0.1662E+05	0.1643E+05
138	-0.1461E+05	1484.	0.0000E+00	126.1	0.0000E+00	0.0000E+00	1508.	0.0000E+00	-0.1463E+05	0.1614E+05	0.1544E+05
139	-9786.	-9548.	0.0000E+00	-1239.	0.0000E+00	0.0000E+00	0.0000E+00	-6218.	-0.1313E+05	0.1313E+05	0.1137E+05
140	-5505.	-0.1342E+05	0.0000E+00	106.1	0.0000E+00	0.0000E+00	0.0000E+00	-5096.	-0.1383E+05	0.1383E+05	0.1219E+05
141	-7150.	-0.1578E+05	0.0000E+00	2314.	0.0000E+00	0.0000E+00	0.0000E+00	-6261.	-0.1667E+05	0.1667E+05	0.1464E+05
142	-6279.	375.2	0.0000E+00	850.0	0.0000E+00	0.0000E+00	751.5	0.0000E+00	-6653.	7407.	7061.
143	-4608.	490.4	0.0000E+00	-561.4	0.0000E+00	0.0000E+00	568.0	0.0000E+00	-4686.	5256.	4999.
144	-7616.	-198.8	0.0000E+00	-240.1	0.0000E+00	0.0000E+00	28.46	-215.2	-7628.	7657.	7340.
145	-7122.	951.5	0.0000E+00	284.5	0.0000E+00	0.0000E+00	978.1	0.0000E+00	-7149.	8127.	7709.
146	-5703.	323.3	0.0000E+00	1403.	0.0000E+00	0.0000E+00	1277.	-489.7	-6166.	7443.	6818.
147	-4232.	-2484.	0.0000E+00	1939.	0.0000E+00	0.0000E+00	434.8	-1571.	-5579.	6013.	5424.
148	-2396.	-432.5	0.0000E+00	4267.	0.0000E+00	0.0000E+00	3332.	156.1	-6317.	9648.	8898.
149	4072.	8552.	0.0000E+00	6164.	0.0000E+00	0.1299E+05	746.5	-1113.	0.1410E+05	0.1329E+05	
150	2197.	-0.1245E+05	0.0000E+00	236.6	0.0000E+00	0.0000E+00	2249.	0.0000E+00	-0.1250E+05	0.1475E+05	0.1377E+05
151	1782.	-0.1486E+05	0.0000E+00	236.6	0.0000E+00	0.0000E+00	1823.	0.0000E+00	-0.1490E+05	0.1672E+05	0.1589E+05
152	679.9	-0.1348E+05	0.0000E+00	159.0	0.0000E+00	0.0000E+00	1072.	-333.8	-0.1353E+05	0.1460E+05	0.1397E+05
153	634.8	-0.1715E+05	0.0000E+00	399.9	0.0000E+00	0.0000E+00	751.5	-59.01	-0.1721E+05	0.1796E+05	0.1758E+05
154	2898.	-0.2124E+05	0.0000E+00	640.9	0.0000E+00	0.0000E+00	2941.	0.0000E+00	-0.2129E+05	0.2423E+05	0.2292E+05
155	-603.2	-4549.	0.0000E+00	1133.	0.0000E+00	0.0000E+00	1373.	-1432.	-5094.	6467.	5797.
156	1123.	62.43	0.0000E+00	2379.	0.0000E+00	0.0000E+00	3188.	16.69	-2019.	5208.	4808.
157	-568.6	4673.	0.0000E+00	5145.	0.0000E+00	0.0000E+00	7853.	258.8	-4008.	0.1184E+05	0.1062E+05
158	-587.3	-0.1442E+05	0.0000E+00	-60.79	0.0000E+00	0.0000E+00	0.0000E+00	-568.6	-0.1444E+05	0.1444E+05	0.1416E+05
159	291.0	-0.1290E+05	0.0000E+00	-60.79	0.0000E+00	0.0000E+00	311.2	0.0000E+00	-0.1292E+05	0.1323E+05	0.1308E+05
160	1709.	-0.1336E+05	0.0000E+00	473.6	0.0000E+00	0.0000E+00	1749.	0.0000E+00	-0.1340E+05	0.1514E+05	0.1436E+05
161	191.8	-0.1772E+05	0.0000E+00	399.9	0.0000E+00	0.0000E+00	908.9	-691.1	-0.1775E+05	0.1866E+05	0.1791E+05
162	-1737.	-0.2022E+05	0.0000E+00	326.2	0.0000E+00	0.0000E+00	0.0000E+00	-1716.	-0.2024E+05	0.2024E+05	0.1944E+05
163	2961.	-4841.	0.0000E+00	341.6	0.0000E+00	0.0000E+00	2994.	0.0000E+00	-4874.	7868.	6886.
164	-247.0	-4281.	0.0000E+00	1266.	0.0000E+00	0.0000E+00	1437.	-1139.	-4826.	6263.	5553.
165	840.3	3572.	0.0000E+00	3549.	0.0000E+00	0.0000E+00	6080.	0.0000E+00	-1667.	7747.	7082.
166	1819.	9250.	0.0000E+00	5401.	0.0000E+00	0.0000E+00	0.1211E+05	373.6	-1415.	0.1353E+05	0.1279E+05
167	-67.33	-0.1313E+05	0.0000E+00	-37.74	0.0000E+00	0.0000E+00	4.357	-53.41	-0.1315E+05	0.1315E+05	0.1313E+05
168	-280.6	-0.1418E+05	0.0000E+00	-37.74	0.0000E+00	0.0000E+00	0.0000E+00	-263.5	-0.1420E+05	0.1420E+05	0.1407E+05
169	-1863.	-0.2070E+05	0.0000E+00	478.5	0.0000E+00	0.0000E+00	0.0000E+00	-1837.	-0.2073E+05	0.2073E+05	0.1988E+05
170	-194.9	-0.1665E+05	0.0000E+00	399.9	0.0000E+00	0.0000E+00	729.4	-894.5	-0.1668E+05	0.1741E+05	0.1665E+05
171	1333.	-0.1502E+05	0.0000E+00	321.3	0.0000E+00	0.0000E+00	1358.	0.0000E+00	-0.1504E+05	0.1640E+05	0.1577E+05
172	-2859.	-0.1159E+05	0.0000E+00	263.0	0.0000E+00	0.0000E+00	0.0000E+00	-2842.	-0.1161E+05	0.1161E+05	0.1068E+05
173	894.7	-4372.	0.0000E+00	742.8	0.0000E+00	0.0000E+00	1368.	-300.4	-4544.	5912.	5407.
174	1148.	1699.	0.0000E+00	2402.	0.0000E+00	0.0000E+00	3924.	30.12	-1106.	5030.	4630.

SPACER DISK THERMAL STRESS ANALYSIS, NORMAL CONDITIONS 10.2781 MAY 1,1990 CP= 266.000

***** POST1 NODAL STRESS LISTING *****

LOAD STEP 1 ITERATION= 1 SECTION= 1
TIME= 0.00000E+00 LOAD CASE= 1

THE FOLLOWING X,Y,Z STRESSES ARE IN GLOBAL COORDINATES

NODE	SX	SY	SZ	SXY	SYZ	SXZ	SIG1	SIG2	SIG3	SI	SIGE
175	1026.	7043.	0.0000E+00	4591.	0.0000E+00	0.0000E+00	9367.	0.0000E+00	-1499.	0.1107E+05	0.1043E+05
176	-365.5	-0.1426E+05	0.0000E+00	168.0	0.0000E+00	0.0000E+00	0.0000E+00	-330.3	-0.1429E+05	0.1429E+05	0.1413E+05
177	-282.4	-0.1306E+05	0.0000E+00	168.0	0.0000E+00	0.0000E+00	0.0000E+00	-240.6	-0.1310E+05	0.1310E+05	0.1298E+05
178	1017.	-0.1917E+05	0.0000E+00	153.5	0.0000E+00	0.0000E+00	1057.	0.0000E+00	-0.1921E+05	0.2027E+05	0.1976E+05
179	-587.2	-0.1801E+05	0.0000E+00	399.9	0.0000E+00	0.0000E+00	571.3	-1104.	-0.1807E+05	0.1864E+05	0.1786E+05
180	-1914.	-0.1382E+05	0.0000E+00	646.3	0.0000E+00	0.0000E+00	0.0000E+00	-1782.	-0.1393E+05	0.1393E+05	0.1315E+05
181	2123.	-3426.	0.0000E+00	-372.2	0.0000E+00	0.0000E+00	2281.	0.0000E+00	-3583.	7864.	7011.
182	-228.0	-7945.	0.0000E+00	266.4	0.0000E+00	0.0000E+00	935.3	-1072.	-8056.	9011.	8238.
183	789.1	-1108.	0.0000E+00	1781.	0.0000E+00	0.0000E+00	1928.	0.0000E+00	-2246.	4174.	3634.
184	1494.	3447.	0.0000E+00	3770.	0.0000E+00	0.0000E+00	7772.	0.0000E+00	-831.7	8604.	8234.
185	696.7	0.1151E+05	0.0000E+00	5942.	0.0000E+00	0.0000E+00	0.1414E+05	0.0000E+00	-1938.	0.1608E+05	0.1526E+05
186	3146.	-0.1331E+05	0.0000E+00	-286.2	0.0000E+00	0.0000E+00	3237.	0.0000E+00	-0.1341E+05	0.1664E+05	0.1529E+05
187	3117.	-0.1400E+05	0.0000E+00	-286.2	0.0000E+00	0.0000E+00	3194.	0.0000E+00	-0.1408E+05	0.1727E+05	0.1592E+05
188	3880.	-0.2571E+05	0.0000E+00	779.0	0.0000E+00	0.0000E+00	3968.	0.0000E+00	-0.2580E+05	0.2976E+05	0.2799E+05
189	4390.	-0.1679E+05	0.0000E+00	399.9	0.0000E+00	0.0000E+00	4719.	0.0000E+00	-0.1691E+05	0.2163E+05	0.1976E+05
190	4658.	-9738.	0.0000E+00	20.85	0.0000E+00	0.0000E+00	4818.	0.0000E+00	-9897.	0.1472E+05	0.1304E+05
191	619.1	-0.1328E+05	0.0000E+00	1542.	0.0000E+00	0.0000E+00	1193.	0.0000E+00	-0.1378E+05	0.1497E+05	0.1442E+05
192	879.9	-7084.	0.0000E+00	1472.	0.0000E+00	0.0000E+00	2248.	-689.2	-7764.	0.1001E+05	8978.
193	-1183.	-913.9	0.0000E+00	1246.	0.0000E+00	0.0000E+00	538.2	-192.2	-2465.	3023.	2743.
194	-307.7	2894.	0.0000E+00	2143.	0.0000E+00	0.0000E+00	4213.	0.0000E+00	-1627.	5840.	5244.
195	-1058.	8581.	0.0000E+00	5116.	0.0000E+00	0.0000E+00	0.1082E+05	0.0000E+00	-3292.	0.1411E+05	0.1293E+05
196	-0.1256E+05	-7714.	0.0000E+00	-1910.	0.0000E+00	0.0000E+00	-7141.	-0.1413E+05		0.1413E+05	0.1258E+05
197	-0.1767E+05	-8931.	0.0000E+00	-2168.	0.0000E+00	0.0000E+00	-7871.	-0.1873E+05		0.1873E+05	0.1703E+05
198	-0.1120E+05	21.79	0.0000E+00	-5350.	0.0000E+00	0.0000E+00	3121.	0.0000E+00	-0.1430E+05	0.1742E+05	0.1669E+05
199	7849.	581.3	0.0000E+00	-4087.	0.0000E+00	0.0000E+00	0.1043E+05	0.0000E+00	-1998.	0.1243E+05	0.1173E+05
200	6116.	-1959.	0.0000E+00	587.5	0.0000E+00	0.0000E+00	6488.	0.0000E+00	-4331.	0.1282E+05	0.1154E+05
201	2215.	365.0	0.0000E+00	5202.	0.0000E+00	0.0000E+00	6303.	0.0000E+00	-5933.	0.1443E+05	0.1330E+05
202	-0.2233E+05	444.5	0.0000E+00	7104.	0.0000E+00	0.0000E+00	2837.	0.0000E+00	-0.2472E+05	0.2756E+05	0.2632E+05
203	-0.2817E+05	-0.1614E+05	0.0000E+00	2465.	0.0000E+00	0.0000E+00	0.1336E+05	-0.3095E+05		0.3095E+05	0.2764E+05
204	-0.1939E+05	-9960.	0.0000E+00	-335.1	0.0000E+00	0.0000E+00	-9321.	-0.2003E+05		0.2003E+05	0.1779E+05
205	-0.2289E+05	-3640.	0.0000E+00	-3394.	0.0000E+00	0.0000E+00	157.7	-5090.	-0.2360E+05	0.2375E+05	0.2221E+05
206	-0.1964E+05	-929.9	0.0000E+00	-6280.	0.0000E+00	0.0000E+00	1898.	-291.1	-0.2216E+05	0.2408E+05	0.2326E+05
207	5767.	1298.	0.0000E+00	-5240.	0.0000E+00	0.0000E+00	0.1076E+05	0.0000E+00	-3693.	0.1445E+05	0.1356E+05
208	6750.	-2138.	0.0000E+00	36.87	0.0000E+00	0.0000E+00	8914.	0.0000E+00	-4302.	0.1322E+05	0.1189E+05
209	6174.	-281.0	0.0000E+00	4196.	0.0000E+00	0.0000E+00	9224.	0.0000E+00	-3331.	0.1256E+05	0.1173E+05
210	-0.1308E+05	696.7	0.0000E+00	5897.	0.0000E+00	0.0000E+00	3617.	0.0000E+00	-0.1600E+05	0.1962E+05	0.1893E+05
211	-0.1914E+05	-9720.	0.0000E+00	2930.	0.0000E+00	0.0000E+00	0.0000E+00	-7492.	-0.2137E+05	0.2137E+05	0.1897E+05
212	-0.1223E+05	-5348.	0.0000E+00	1441.	0.0000E+00	0.0000E+00	0.0000E+00	-4570.	-0.1303E+05	0.1303E+05	0.1150E+05
213	-7811.	-14.91	0.0000E+00	-753.9	0.0000E+00	0.0000E+00	806.9	-403.4	-8227.	9034.	8515.
214	-3010.	526.1	0.0000E+00	-355.7	0.0000E+00	0.0000E+00	1285.	-31.91	-3736.	5021.	4646.
215	-4800.	4261.	0.0000E+00	3668.	0.0000E+00	0.0000E+00	5787.	0.0000E+00	-6326.	0.1211E+05	0.1072E+05
216	-0.1167E+05	-5277.	0.0000E+00	-2370.	0.0000E+00	0.0000E+00	0.0000E+00	-4431.	-0.1251E+05	0.1251E+05	0.1111E+05
217	-0.1193E+05	-914.3	0.0000E+00	-4382.	0.0000E+00	0.0000E+00	1195.	-403.9	-0.1364E+05	0.1483E+05	0.1412E+05

SPACER DISK THERMAL STRESS ANALYSIS, NORMAL CONDITIONS 10.2783 MAY 1,1990 CP= 266.660

***** POST1 NODAL STRESS LISTING *****

LOAD STEP 1 ITERATION= 1 SECTION= 1
TIME= 0.00000E+00 LOAD CASE= 1

THE FOLLOWING X,Y,Z STRESSES ARE IN GLOBAL COORDINATES

NODE	SX	SY	SZ	SXY	SYZ	SXZ	SIG1	SIG2	SIG3	SI	SIGE
218	-0.1234E+05	1384.	0.0000E+00	-4534.	0.0000E+00	0.0000E+00	2833.	0.0000E+00	-0.1379E+05	0.1662E+05	0.1542E+05
219	-0.1079E+05	-4330.	0.0000E+00	-1293.	0.0000E+00	0.0000E+00	0.0000E+00	-3476.	-0.1167E+05	0.1167E+05	0.1061E+05
220	-0.1035E+05	-4188.	0.0000E+00	2263.	0.0000E+00	0.0000E+00	0.0000E+00	-2965.	-0.1158E+05	0.1158E+05	0.1061E+05
221	-0.1264E+05	1993.	0.0000E+00	3824.	0.0000E+00	0.0000E+00	4146.	0.0000E+00	-0.1479E+05	0.1894E+05	0.1727E+05
222	-0.1172E+05	-1971.	0.0000E+00	3619.	0.0000E+00	0.0000E+00	1845.	-881.9	-0.1465E+05	0.1649E+05	0.1534E+05
223	-0.1265E+05	-6325.	0.0000E+00	-777.9	0.0000E+00	0.0000E+00	0.0000E+00	-4702.	-0.1427E+05	0.1427E+05	0.1273E+05
224	-0.1120E+05	-749.9	0.0000E+00	-5318.	0.0000E+00	0.0000E+00	1987.	-312.2	-0.1362E+05	0.1561E+05	0.1464E+05
225	-0.1260E+05	1353.	0.0000E+00	-5674.	0.0000E+00	0.0000E+00	3479.	0.0000E+00	-0.1472E+05	0.1820E+05	0.1676E+05
226	-0.1061E+05	-5149.	0.0000E+00	-1734.	0.0000E+00	0.0000E+00	0.0000E+00	-3811.	-0.1195E+05	0.1195E+05	0.1083E+05
227	-9647.	-2901.	0.0000E+00	1883.	0.0000E+00	0.0000E+00	144.4	-2158.	-0.1053E+05	0.1068E+05	9818.
228	-0.1173E+05	2077.	0.0000E+00	4780.	0.0000E+00	0.0000E+00	3660.	0.0000E+00	-0.1332E+05	0.1698E+05	0.1549E+05
229	-0.1151E+05	-2041.	0.0000E+00	4575.	0.0000E+00	0.0000E+00	1106.	-948.4	-0.1371E+05	0.1482E+05	0.1393E+05
230	-9157.	-4147.	0.0000E+00	349.8	0.0000E+00	0.0000E+00	0.0000E+00	-3249.	-0.1005E+05	0.1005E+05	9004.
231	-8225.	568.0	0.0000E+00	-2120.	0.0000E+00	0.0000E+00	1118.	-53.87	-8721.	9839.	9336.
232	-7252.	-377.9	0.0000E+00	-1921.	0.0000E+00	0.0000E+00	570.8	-379.5	-7821.	8392.	7977.
233	-4760.	-369.3	0.0000E+00	754.7	0.0000E+00	0.0000E+00	1463.	-246.3	-6346.	7809.	7382.
234	-91.28	-1621.	0.0000E+00	-1977.	0.0000E+00	0.0000E+00	1264.	0.0000E+00	-2978.	4239.	3770.
235	-6583.	-1926.	0.0000E+00	-3413.	0.0000E+00	0.0000E+00	853.8	-688.3	-8675.	9529.	8949.
236	-0.2643E+05	2426.	0.0000E+00	-5021.	0.0000E+00	0.0000E+00	3398.	0.0000E+00	-0.2740E+05	0.3080E+05	0.2841E+05
237	-0.2711E+05	-0.1020E+05	0.0000E+00	-2861.	0.0000E+00	0.0000E+00	0.0000E+00	-9620.	-0.2769E+05	0.2769E+05	0.2531E+05
238	-0.1795E+05	-8851.	0.0000E+00	149.5	0.0000E+00	0.0000E+00	0.0000E+00	-8582.	-0.1822E+05	0.1822E+05	0.1605E+05
239	-0.2434E+05	-0.1074E+05	0.0000E+00	3253.	0.0000E+00	0.0000E+00	0.0000E+00	-9607.	-0.2567E+05	0.2567E+05	0.2375E+05
240	-0.1877E+05	2707.	0.0000E+00	6446.	0.0000E+00	0.0000E+00	5307.	0.0000E+00	-0.2137E+05	0.2668E+05	0.2535E+05
241	6397.	-2703.	0.0000E+00	4134.	0.0000E+00	0.0000E+00	8944.	0.0000E+00	-5290.	0.1423E+05	0.1331E+05
242	0.1226E+05	-1831.	0.0000E+00	-540.1	0.0000E+00	0.0000E+00	0.1264E+05	0.0000E+00	-2216.	0.1486E+05	0.1388E+05
243	2605.	-2471.	0.0000E+00	-4336.	0.0000E+00	0.0000E+00	6309.	0.0000E+00	-6173.	0.1248E+05	0.1193E+05
244	-0.2134E+05	3251.	0.0000E+00	-6108.	0.0000E+00	0.0000E+00	5098.	0.0000E+00	-0.2318E+05	0.2827E+05	0.2661E+05
245	-0.2762E+05	-0.1492E+05	0.0000E+00	-3338.	0.0000E+00	0.0000E+00	0.0000E+00	-0.1305E+05	-0.2949E+05	0.2949E+05	0.2673E+05
246	-0.1832E+05	-9130.	0.0000E+00	139.7	0.0000E+00	0.0000E+00	0.0000E+00	-8838.	-0.1863E+05	0.1863E+05	0.1637E+05
247	-0.2465E+05	-6466.	0.0000E+00	2913.	0.0000E+00	0.0000E+00	0.0000E+00	-5973.	-0.2515E+05	0.2515E+05	0.2345E+05
248	-0.2481E+05	1473.	0.0000E+00	5363.	0.0000E+00	0.0000E+00	2775.	0.0000E+00	-0.2611E+05	0.2888E+05	0.2786E+05
249	-3829.	-2213.	0.0000E+00	3254.	0.0000E+00	0.0000E+00	1032.	-257.9	-6816.	7849.	7532.
250	71.37	-1812.	0.0000E+00	-486.9	0.0000E+00	0.0000E+00	1067.	0.0000E+00	-2808.	3874.	3469.
251	-4783.	300.6	0.0000E+00	-1950.	0.0000E+00	0.0000E+00	1343.	-43.68	-5781.	7124.	6823.
252	-0.1416E+05	2209.	0.0000E+00	-2113.	0.0000E+00	0.0000E+00	2483.	0.0000E+00	-0.1443E+05	0.1691E+05	0.1582E+05
253	-0.1307E+05	-6516.	0.0000E+00	-1208.	0.0000E+00	0.0000E+00	0.0000E+00	-5133.	-0.1445E+05	0.1445E+05	0.1272E+05
254	4536.	-0.1429E+05	0.0000E+00	-387.2	0.0000E+00	0.0000E+00	4672.	0.0000E+00	-0.1442E+05	0.1910E+05	0.1725E+05
255	4351.	-0.1522E+05	0.0000E+00	0.4734E-09	0.0000E+00	0.0000E+00	4501.	0.0000E+00	-0.1537E+05	0.1987E+05	0.1806E+05
256	4421.	-0.1772E+05	0.0000E+00	387.2	0.0000E+00	0.0000E+00	4537.	0.0000E+00	-0.1784E+05	0.2237E+05	0.2049E+05
257	4767.	-0.2217E+05	0.0000E+00	-396.1	0.0000E+00	0.0000E+00	4867.	0.0000E+00	-0.2227E+05	0.2714E+05	0.2507E+05
258	4383.	-0.1532E+05	0.0000E+00	0.1324E-08	0.0000E+00	0.0000E+00	4538.	0.0000E+00	-0.1547E+05	0.2001E+05	0.1818E+05
259	4359.	-0.1001E+05	0.0000E+00	396.1	0.0000E+00	0.0000E+00	4342.	0.0000E+00	-0.1020E+05	0.1474E+05	0.1310E+05
260	601.3	-4822.	0.0000E+00	-1295.	0.0000E+00	0.0000E+00	903.6	0.0000E+00	-5125.	6028.	5674.

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SPACER DISK THERMAL STRESS ANALYSIS, NORMAL CONDITIONS                    10.2784  MAY  1,1990 CP=    267.210

        ***** POST1 NODAL STRESS LISTING *****

 LOAD STEP     1  ITERATION=     1  SECTION=  1
 TIME=   0.00000E+00       LOAD CASE=  1

 THE FOLLOWING X,Y,Z STRESSES ARE IN GLOBAL COORDINATES

  NODE      SX          SY          SZ          SXY         SYZ         SXZ         SIG1        SIG2        SIG3         SI          SIGE
   261   -470.4    -0.1308E+05 0.0000E+00   216.0     0.0000E+00 0.0000E+00 0.0000E+00 -383.0   -0.1317E+05 0.1317E+05 0.1298E+05
   262   -434.9    -0.1643E+05 0.0000E+00 0.2671E-09   0.0000E+00 0.0000E+00 0.0000E+00 -372.2   -0.1649E+05 0.1649E+05 0.1631E+05
   263   -435.6    -0.1651E+05 0.0000E+00  -216.0      0.0000E+00 0.0000E+00 0.0000E+00 -367.8   -0.1657E+05 0.1657E+05 0.1639E+05
   264   -524.7    -0.2097E+05 0.0000E+00   219.9      0.0000E+00 0.0000E+00 0.0000E+00 -470.2   -0.2103E+05 0.2103E+05 0.2079E+05
   265   -434.4    -0.1654E+05 0.0000E+00 0.7483E-09   0.0000E+00 0.0000E+00 0.0000E+00 -376.0   -0.1660E+05 0.1660E+05 0.1642E+05
   266   -394.1      -8777.    0.0000E+00  -219.9      0.0000E+00 0.0000E+00 0.0000E+00 -233.4     -8917.      8917.       8794.
   267   -568.2      -2621.    0.0000E+00  -527.6      0.0000E+00 0.0000E+00 0.0000E+00 -433.5     -2736.      2736.       2574.
   268   -230.9    -0.1468E+05 0.0000E+00  -780.9      0.0000E+00 0.0000E+00 0.0000E+00 -188.8   -0.1472E+05 0.1472E+05 0.1463E+05
   269   -249.2    -0.1482E+05 0.0000E+00 0.9663E-10   0.0000E+00 0.0000E+00 0.0000E+00 -207.5   -0.1487E+05 0.1487E+05 0.1476E+05
   270   -256.9    -0.1812E+05 0.0000E+00   780.9      0.0000E+00 0.0000E+00 0.0000E+00 -222.8   -0.1815E+05 0.1815E+05 0.1804E+05
   271   -214.8    -0.2259E+05 0.0000E+00  -793.7      0.0000E+00 0.0000E+00 0.0000E+00 -186.7   -0.2262E+05 0.2262E+05 0.2253E+05
   272   -255.6    -0.1490E+05 0.0000E+00-0.9703E-10   0.0000E+00 0.0000E+00 0.0000E+00 -212.7   -0.1493E+05 0.1493E+05 0.1484E+05
   273   -285.2    -0.1043E+05 0.0000E+00   793.7      0.0000E+00 0.0000E+00 0.0000E+00 -223.4   -0.1049E+05 0.1049E+05 0.1038E+05
   274   -304.5      -2068.    0.0000E+00  -298.0      0.0000E+00 0.0000E+00 0.0000E+00 -448.6     -2123.      2123.       1937.

 MINIMUMS
 NODE        203         188           1           206           1           1           63          203         203          112         112
 VALUE  -0.2817E+05-0.2571E+05 0.0000E+00   -6280.      0.0000E+00 0.0000E+00 0.0000E+00-0.1336E+05-0.3095E+05  1250.       1191.

 MAXIMUMS
 NODE        1           28          1           9           1           1           70          32          6           70          70
 VALUE  0.4274E+05 0.3198E+05 0.0000E+00 0.1336E+05 0.0000E+00 0.0000E+00 0.4439E+05  5234.    0.0000E+00 0.4512E+05 0.4281E+05

 PRINT NODAL DISPLACEMENTS
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SPACER DISK THERMAL STRESS ANALYSIS, NORMAL CONDITIONS                    10.2786  MAY  1,1990 CP=     267.820

        ***** POST1 NODAL DISPLACEMENT LISTING *****

 LOAD STEP     1  ITERATION=     1  SECTION=  1
 TIME=   0.00000E+00      LOAD CASE=  1

 THE FOLLOWING X,Y,Z DISPLACEMENTS ARE IN GLOBAL COORDINATES

   NODE        UX              UY
     1   0.00000000E+00 -0.47108977E-01
     2   0.29887904E-02 -0.46583080E-01
     3   0.57757240E-02 -0.45191440E-01
     4   0.83114496E-02 -0.43201383E-01
     5   0.10517384E-01 -0.40847292E-01
     6   0.12478290E-01 -0.38489600E-01
     7   0.14371348E-01 -0.36468230E-01
     8   0.16425386E-01 -0.36048154E-01
     9   0.19414282E-01 -0.36227635E-01
    10   0.22031237E-01 -0.35448770E-01
    11   0.24101737E-01 -0.34345025E-01
    12   0.25937650E-01 -0.33192405E-01
    13   0.27700571E-01 -0.32000985E-01
    14   0.29376140E-01 -0.30785794E-01
    15   0.31033726E-01 -0.29570206E-01
    16   0.32721717E-01 -0.28324441E-01
    17   0.34419742E-01 -0.27018138E-01
    18   0.36161038E-01 -0.25667006E-01
    19   0.37919030E-01 -0.24247543E-01
    20   0.39615154E-01 -0.22753314E-01
    21   0.41241928E-01 -0.21229985E-01
    22   0.42819755E-01 -0.19657514E-01
    23   0.44357059E-01 -0.18011284E-01
    24   0.45833057E-01 -0.16259478E-01
    25   0.47260441E-01 -0.14387562E-01
    26   0.48629962E-01 -0.12337052E-01
    27   0.49788033E-01 -0.99671279E-02
    28   0.50467395E-01 -0.73878328E-02
    29   0.50771796E-01 -0.48079976E-02
    30   0.50805491E-01 -0.23451719E-02
    31   0.50796092E-01  0.00000000E+00
    32   0.00000000E+00 -0.46509760E-01
    33   0.24994169E-02 -0.46029415E-01
    34   0.50563030E-02 -0.44671620E-01
    35   0.73299457E-02 -0.42721147E-01
    36   0.94408305E-02 -0.40429130E-01
    37   0.11485862E-01 -0.38049045E-01
    38   0.13686016E-01 -0.36071556E-01
    40   0.19626186E-01 -0.33514159E-01
    41   0.21860757E-01 -0.34860889E-01
    42   0.23813777E-01 -0.33799232E-01
    43   0.25625913E-01 -0.32663749E-01
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SPACER DISK THERMAL STRESS ANALYSIS, NORMAL CONDITIONS 10.2787 MAY 1,1990 CP= 268.090

***** POST1 NODAL DISPLACEMENT LISTING *****

LOAD STEP 1 ITERATION= 1 SECTION= 1
TIME= 0.00000E+00 LOAD CASE= 1

THE FOLLOWING X,Y,Z DISPLACEMENTS ARE IN GLOBAL COORDINATES

NODE	UX	UY
44	0.27349344E-01	-0.31473778E-01
45	0.29011044E-01	-0.30238220E-01
46	0.30677226E-01	-0.29026051E-01
47	0.32363319E-01	-0.27774552E-01
48	0.34058892E-01	-0.26431090E-01
49	0.35809990E-01	-0.25080290E-01
50	0.37572463E-01	-0.23638116E-01
51	0.39236325E-01	-0.22139179E-01
52	0.40830385E-01	-0.20643599E-01
53	0.42403896E-01	-0.19075326E-01
54	0.43920162E-01	-0.17469922E-01
55	0.45370232E-01	-0.15721823E-01
56	0.46779478E-01	-0.13870341E-01
57	0.48114910E-01	-0.11874440E-01
58	0.49230443E-01	-0.97000436E-02
59	0.49881426E-01	-0.72444026E-02
60	0.50147180E-01	-0.47615144E-02
61	0.50153691E-01	-0.23686134E-02
62	0.50153782E-01	0.00000000E+00
63	0.00000000E+00	-0.44325919E-01
64	0.88370402E-03	-0.44300975E-01
65	0.26313742E-02	-0.43238881E-01
66	0.47270256E-02	-0.41686348E-01
67	0.70671434E-02	-0.39729587E-01
68	0.97086294E-02	-0.37631461E-01
69	0.12835145E-01	-0.35838881E-01
70	0.16549310E-01	-0.35314883E-01
71	0.00000000E+00	-0.42308350E-01
72	0.10701591E-02	-0.42355680E-01
73	0.18311645E-01	-0.33858792E-01
74	0.19908708E-01	-0.34462052E-01
76	0.00000000E+00	-0.40346342E-01
77	0.10779943E-02	-0.40332949E-01
78	0.18655443E-01	-0.32465756E-01
79	0.20443095E-01	-0.32592416E-01
80	0.22468851E-01	-0.32699514E-01
81	0.24393670E-01	-0.32502945E-01
82	0.00000000E+00	-0.38213524E-01
83	0.11262360E-02	-0.38226361E-01
84	0.18510829E-01	-0.30827440E-01
85	0.20466315E-01	-0.30717456E-01
86	0.22662519E-01	-0.30682006E-01

SPACER DISK THERMAL STRESS ANALYSIS, NORMAL CONDITIONS 10.2787 MAY 1,1990 CP= 268.310

***** POST1 NODAL DISPLACEMENT LISTING *****

LOAD STEP 1 ITERATION= 1 SECTION= 1
TIME= 0.00000E+00 LOAD CASE= 1

THE FOLLOWING X,Y,Z DISPLACEMENTS ARE IN GLOBAL COORDINATES

NODE	UX	UY
87	0.24733160E-01	-0.30584295E-01
88	0.26714828E-01	-0.30373340E-01
89	0.00000000E+00	-0.35999491E-01
90	0.11621081E-02	-0.36019267E-01
91	0.18246649E-01	-0.28904745E-01
92	0.20248496E-01	-0.28711414E-01
93	0.22635507E-01	-0.28568836E-01
94	0.24860485E-01	-0.28460837E-01
95	0.27000850E-01	-0.28354670E-01
96	0.29088829E-01	-0.28265152E-01
97	0.31047124E-01	-0.28122752E-01
98	0.00000000E+00	-0.33744875E-01
99	0.11830387E-02	-0.33704076E-01
100	0.17851389E-01	-0.26845700E-01
101	0.19981871E-01	-0.26566185E-01
102	0.22480644E-01	-0.26272285E-01
103	0.24868378E-01	-0.26135063E-01
104	0.27172348E-01	-0.26117332E-01
105	0.29423180E-01	-0.26145063E-01
106	0.31616088E-01	-0.26181890E-01
107	0.33615880E-01	-0.26163469E-01
108	0.00000000E+00	-0.31346755E-01
109	0.11840499E-02	-0.31441284E-01
110	0.41634159E-02	-0.31241688E-01
111	0.70976438E-02	-0.30279713E-01
112	0.98990071E-02	-0.28927756E-01
113	0.12585515E-01	-0.27384589E-01
114	0.15127389E-01	-0.25943214E-01
115	0.17469722E-01	-0.24755784E-01
116	0.19612488E-01	-0.24190434E-01
117	0.22275787E-01	-0.23707474E-01
118	0.24788212E-01	-0.23538391E-01
119	0.27264869E-01	-0.23615492E-01
120	0.29684563E-01	-0.23756432E-01
121	0.32053632E-01	-0.23923649E-01
122	0.34350310E-01	-0.24083996E-01
123	0.00000000E+00	-0.30372215E-01
124	0.11661864E-02	-0.30411217E-01
125	0.39619386E-02	-0.30104130E-01
126	0.66368145E-02	-0.29161452E-01
127	0.93459059E-02	-0.27809089E-01
128	0.12028319E-01	-0.26279845E-01

```
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 FOR SUPPORT CALL STEVE PORTER      PHONE (206) 074-2235    TWX

SPACER DISK THERMAL STRESS ANALYSIS, NORMAL CONDITIONS                  10.2788  MAY  1,1990 CP=    268.580

        ***** POST1 NODAL DISPLACEMENT LISTING *****

 LOAD STEP     1  ITERATION=     1  SECTION=  1
 TIME=   0.00000E+00      LOAD CASE=  1

 THE FOLLOWING X,Y,Z DISPLACEMENTS ARE IN GLOBAL COORDINATES

   NODE        UX              UY
    129   0.14595165E-01 -0.24847050E-01
    130   0.17233260E-01 -0.23804222E-01
    131   0.18316864E-01 -0.23533962E-01
    132   0.00000000E+00 -0.29301112E-01
    133   0.12460835E-02 -0.29230768E-01
    134   0.36752208E-02 -0.28796532E-01
    135   0.62200479E-02 -0.27890180E-01
    136   0.87948285E-02 -0.26550534E-01
    137   0.11437084E-01 -0.25033675E-01
    138   0.14170010E-01 -0.23613570E-01
    139   0.16889062E-01 -0.22697633E-01
    140   0.18113289E-01 -0.22583161E-01
    141   0.19286706E-01 -0.22281020E-01
    142   0.22012687E-01 -0.21501489E-01
    143   0.24766103E-01 -0.21432803E-01
    144   0.27357578E-01 -0.21528446E-01
    145   0.29842594E-01 -0.21737783E-01
    146   0.32288684E-01 -0.21966671E-01
    147   0.34788451E-01 -0.22292028E-01
    148   0.35745663E-01 -0.22448312E-01
    149   0.37786253E-01 -0.22731686E-01
    150   0.00000000E+00 -0.26367408E-01
    151   0.14327650E-02 -0.26430205E-01
    152   0.16736145E-01 -0.19923497E-01
    153   0.18097003E-01 -0.20028431E-01
    154   0.19428977E-01 -0.20261813E-01
    155   0.33564593E-01 -0.19734835E-01
    156   0.36361373E-01 -0.20088540E-01
    157   0.38716010E-01 -0.20636933E-01
    158   0.00000000E+00 -0.23552862E-01
    159   0.14263527E-02 -0.23532439E-01
    160   0.17422914E-01 -0.17214475E-01
    161   0.18766181E-01 -0.17372731E-01
    162   0.20131734E-01 -0.17906301E-01
    163   0.36446318E-01 -0.17600693E-01
    164   0.37375072E-01 -0.17869471E-01
    165   0.39358266E-01 -0.18462633E-01
    166   0.41449656E-01 -0.18899181E-01
    167   0.00000000E+00 -0.20611261E-01
    168   0.14521832E-02 -0.20606656E-01
    169   0.18356780E-01 -0.14590143E-01
    170   0.19761305E-01 -0.15010048E-01
```

```
          ANSYS - ENGINEERING ANALYSIS SYSTEM  REVISION 4.4          NUCLEAR FACIL     MAY 1,1989
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SPACER DISK THERMAL STRESS ANALYSIS, NORMAL CONDITIONS                    10.2789  MAY  1,1990 CP=     268.800

        ***** POST1 NODAL DISPLACEMENT LISTING *****

 LOAD STEP     1  ITERATION=     1  SECTION=  1
 TIME=   0.00000E+00      LOAD CASE=  1

 THE FOLLOWING X,Y,Z DISPLACEMENTS ARE IN GLOBAL COORDINATES

   NODE       UX              UY
   171   0.21106159E-01 -0.15394724E-01
   172   0.37028971E-01 -0.13460480E-01
   173   0.38078813E-01 -0.13708133E-01
   174   0.40378039E-01 -0.14290306E-01
   175   0.42376732E-01 -0.14786630E-01
   176   0.00000000E+00 -0.17608797E-01
   177   0.14569402E-02 -0.17656612E-01
   178   0.19342527E-01 -0.12077891E-01
   179   0.20722124E-01 -0.12354652E-01
   180   0.22101500E-01 -0.12771391E-01
   181   0.37684240E-01 -0.13291485E-01
   182   0.38679965E-01 -0.13502771E-01
   183   0.41108892E-01 -0.14119962E-01
   184   0.43244657E-01 -0.14624790E-01
   185   0.45068575E-01 -0.15043506E-01
   186   0.00000000E+00 -0.14702961E-01
   187   0.15167381E-02 -0.14611290E-01
   188   0.19919542E-01 -0.95480277E-02
   189   0.21431372E-01 -0.98433393E-02
   190   0.22847964E-01 -0.98883074E-02
   191   0.38201263E-01 -0.10962968E-01
   192   0.39338730E-01 -0.11324275E-01
   193   0.41822825E-01 -0.11855925E-01
   194   0.44027585E-01 -0.12398760E-01
   195   0.46007369E-01 -0.12863900E-01
   196   0.00000000E+00 -0.11544989E-01
   197   0.12404692E-02 -0.11639012E-01
   198   0.38619798E-02 -0.12874334E-01
   199   0.74141480E-02 -0.13908050E-01
   200   0.11480446E-01 -0.13742186E-01
   201   0.15393271E-01 -0.12035068E-01
   202   0.18581615E-01 -0.94202956E-02
   203   0.20328439E-01 -0.71299187E-02
   204   0.21638206E-01 -0.69801980E-02
   205   0.22696494E-01 -0.70750669E-02
   206   0.24371194E-01 -0.88243034E-02
   207   0.27546891E-01 -0.10959634E-01
   208   0.31151256E-01 -0.12151880E-01
   209   0.34710636E-01 -0.11782469E-01
   210   0.37541068E-01 -0.10310304E-01
   211   0.39217449E-01 -0.88437178E-02
   212   0.40129613E-01 -0.88600211E-02
```

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SPACER DISK THERMAL STRESS ANALYSIS, NORMAL CONDITIONS                    10.2789  MAY  1,1990 CP=    269.020

        ***** POST1 NODAL DISPLACEMENT LISTING *****

 LOAD STEP     1  ITERATION=     1  SECTION=  1
 TIME=   0.00000E+00      LOAD CASE=  1

 THE FOLLOWING X,Y,Z DISPLACEMENTS ARE IN GLOBAL COORDINATES

   NODE        UX              UY
    213   0.42395126E-01 -0.93632409E-02
    214   0.44671063E-01 -0.10035890E-01
    215   0.46823527E-01 -0.10629901E-01
    216   0.00000000E+00 -0.93628691E-02
    217   0.32992927E-02 -0.99103634E-02
    218   0.63179023E-02 -0.11303266E-01
    219   0.95811542E-02 -0.11863171E-01
    220   0.12209346E-01 -0.11106075E-01
    221   0.15414161E-01 -0.87535096E-02
    222   0.18286443E-01 -0.59448117E-02
    223   0.21529492E-01 -0.49130053E-02
    224   0.24627204E-01 -0.57221979E-02
    225   0.27342043E-01 -0.80687627E-02
    226   0.30276234E-01 -0.99693208E-02
    227   0.32589970E-01 -0.10341017E-01
    228   0.35293023E-01 -0.93681872E-02
    229   0.37611277E-01 -0.76895674E-02
    230   0.40241220E-01 -0.71622991E-02
    231   0.42690071E-01 -0.76413462E-02
    232   0.44992088E-01 -0.83049811E-02
    233   0.47209837E-01 -0.91729714E-02
    234   0.00000000E+00 -0.70792681E-02
    235   0.37236964E-02 -0.73899636E-02
    236   0.69334471E-02 -0.88263012E-02
    237   0.91401788E-02 -0.95682271E-02
    238   0.10349224E-01 -0.93413322E-02
    239   0.11531890E-01 -0.88648691E-02
    240   0.13811781E-01 -0.83481346E-02
    241   0.17339983E-01 -0.37931277E-02
    242   0.21418036E-01 -0.27893924E-02
    243   0.25404108E-01 -0.36005430E-02
    244   0.28666868E-01 -0.57773059E-02
    245   0.30700531E-01 -0.79203700E-02
    246   0.31786166E-01 -0.82575450E-02
    247   0.32804766E-01 -0.83420939E-02
    248   0.34472549E-01 -0.72840787E-02
    249   0.37158807E-01 -0.58682274E-02
    250   0.40191094E-01 -0.53642607E-02
    251   0.43091427E-01 -0.58660413E-02
    252   0.45476965E-01 -0.67694274E-02
    253   0.47390868E-01 -0.76501450E-02
    254   0.80107288E-02 -0.64245384E-02
```

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SPACER DISK THERMAL STRESS ANALYSIS, NORMAL CONDITIONS                    10.2790  MAY  1,1990 CP=    269.240

        ***** POST1 NODAL DISPLACEMENT LISTING *****

 LOAD STEP     1  ITERATION=     1  SECTION=  1
 TIME=   0.00000E+00      LOAD CASE=  1

 THE FOLLOWING X,Y,Z DISPLACEMENTS ARE IN GLOBAL COORDINATES

   NODE        UX                UY
    255   0.96203236E-02 -0.60646467E-02
    256   0.11214970E-01 -0.59582277E-02
    257   0.30728185E-01 -0.53340208E-02
    258   0.32236622E-01 -0.53476764E-02
    259   0.33647223E-01 -0.56207058E-02
    260   0.47014474E-01 -0.51874163E-02
    261   0.76460460E-02 -0.31655703E-02
    262   0.91823232E-02 -0.31089269E-02
    263   0.10706612E-01 -0.29324247E-02
    264   0.31068108E-01 -0.26225852E-02
    265   0.32502385E-01 -0.27540235E-02
    266   0.33847012E-01 -0.27643956E-02
    267   0.46919641E-01 -0.26203824E-02
    268   0.74982084E-02  0.00000000E+00
    269   0.90369633E-02  0.00000000E+00
    270   0.10564702E-01  0.00000000E+00
    271   0.31151085E-01  0.00000000E+00
    272   0.32591684E-01  0.00000000E+00
    273   0.33939963E-01  0.00000000E+00
    274   0.46862087E-01  0.00000000E+00

 MAXIMUMS
 NODE          30               1
 VALUE    0.50803491E-01 -0.47108977E-01

 /SHOW SWITCH PLOTS TO FILE PLOTS            - VECTOR MODE

 PRODUCE STRESS PLOT,  LABEL= TEMP  KAVG= 0

 CUMULATIVE DISPLAY NUMBER   1 WRITTEN TO FILE PLOTS            - VECTOR MODE
 DISPLAY TITLE= SPACER DISK THERMAL STRESS ANALYSIS, NORMAL CONDITIONS

 PRODUCE STRESS PLOT,  LABEL= SI    KAVG= 0

 CUMULATIVE DISPLAY NUMBER   2 WRITTEN TO FILE PLOTS            - VECTOR MODE
 DISPLAY TITLE= SPACER DISK THERMAL STRESS ANALYSIS, NORMAL CONDITIONS


 ***** ROUTINE COMPLETED *****  CP =       278.420

 /EOF ENCOUNTERED ON FILE8


 PREP7 AFWRITE OR SFWRITE WARNING MESSAGES =   1
 NUMBER OF SOLUTION PHASE WARNING MESSAGES =   0


 ***** RUN COMPLETED *****  CP=      278.8600   TIME=   10.2817
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
  1  /PREP7
  2  /TITLE,SPACER DISK THERMAL STRESS ANALYSIS, ACCIDENT CONDITIONS
  3  KAN,-1
  4  ET,1,35
  5  DENS,1,0.00073
  6  MUXY,1,0.29
  7  EX,1,26.2E6
  8  KXX,1,8.8
  9  ALPX,1,8.92E-6
 10  C*** NODE GENERATION
 11  CSYS,1
 12  N,1,18.655,-90
 13  N,31,18.655,0
 14  FILL
 15  NGEN,2,31,1,31,1,-0.49
 16  NDELE,39
 17  CSYS,0
 18  N,63,0,-17
 19  N,64,0.4,-17
 20  N,70,6.4,-17
 21  FILL
 22  N,71,0,-16
 23  N,72,.4,-16
 24  N,73,6.4,-16
 25  N,74,7.2,-16
 26  NGEN,2,3,71,74,1,,1.0
 27  N,80,8.2,-15
 28  N,81,9.2,-15
 29  NGEN,2,6,76,81,1,,1.0
 30  N,88,10.2,-14
 31  NGEN,2,7,82,88,1,,1.0
 32  N,96,11.2,-13
 33  N,97,12.2,-13
 34  NGEN,2,9,89,97,1,,1.0
 35  N,107,13.2,-12
 36  N,108,0,-11
 37  N,109,.4,-11
 38  N,115,6.4,-11
 39  FILL
 40  N,116,7.2,-11
 41  N,122,13.2,-11
 42  FILL
 43  NGEN,2,15,108,115,1,,.375
 44  N,131,6.8,-10.625
 45  NGEN,2,9,123,131,1,,.375
 46  N,141,7.2,-10.25
 47  N,147,13.2,-10.25
 48  FILL
 49  N,148,13.6,-10.25
 50  N,149,14.6,-10.25
 51  N,150,0,-9.25
 52  N,151,.4,-9.25
 53  N,152,6.4,-9.25
 54  N,153,6.8,-9.25
 55  N,154,7.2,-9.25
 56  N,155,13.2,-9.25
 57  N,156,13.6,-9.25
 58  N,157,14.6,-9.25
 59  NGEN,2,8,150,157,1,,1.0
 60  N,166,15.6,-8.25
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
  61  NGEN,2,9,138,166,1,,1.0
  62  NGEN,2,9,167,175,1,,1.0
  63  N,185,16.6,-6.25
  64  NGEN,2,10,176,185,1,,1.0
  65  NGEN,2,64,132,148,1,,6.0
  66  N,213,16.6,-4.25
  67  FILL,212,215
  68  N,216,0,-3.625
  69  N,219,3,-3.625
  70  FILL
  71  N,220,3.8,-3.625
  72  N,226,9.8,-3.625
  73  FILL
  74  N,227,10.6,-3.625
  75  N,233,16.6,-3.625
  76  FILL
  77  NGEN,2,18,216,219,1,,0.625
  78  N,238,3.4,-3.0
  79  N,239,3.8,-3.0
  80  N,245,9.8,-3.0
  81  FILL
  82  N,246,10.2,-3.0
  83  N,247,10.6,-3.0
  84  N,253,16.6,-3.0
  85  FILL
  86  NGEN,2,17,237,239,1,,1.0
  87  NGEN,2,12,245,247,1,,1.0
  88  N,260,16.6,-2
  89  NGEN,3,7,254,260,1,,1.0
  90  C*** ELEMENT GENERATION
  91  E,1,2,33,32
  92  EGEN,6,1,-1
  93  E,7,8,70,38
  94  E,8,9,40,70
  95  E,9,10,41,40
  96  EGEN,22,1,-1
  97  E,32,64,63
  98  E,32,33,64
  99  E,33,34,65,64
 100  EGEN,5,1,-1
 101  E,38,70,69
 102  E,63,64,72,71
 103  E,70,40,74,73
 104  E,40,41,74
 105  E,71,72,77,76
 106  E,73,74,79,78
 107  E,74,41,80,79
 108  E,41,42,81,80
 109  E,42,43,81
 110  E,76,77,83,82
 111  E,78,79,85,84
 112  E,79,80,86,85
 113  E,80,81,87,86
 114  E,81,43,44
 115  E,81,44,88
 116  E,81,88,87
 117  E,82,83,90,89
 118  E,84,85,92,91
 119  EGEN,4,1,-1
 120  E,88,45,96,95
```

********** ANSYS INPUT DATA LISTING (FILE16) **********

```
121   E,44,45,88
122   E,45,46,96
123   E,46,97,96
124   E,46,47,97
125   E,89,90,99,98
126   E,91,92,101,100
127   EGEN,6,1,-1
128   E,97,47,106
129   E,47,107,106
130   E,47,48,107
131   E,98,99,109,108
132   E,100,101,116,115
133   EGEN,7,1,-1
134   E,48,49,107
135   E,107,49,122
136   E,49,50,122
137   E,108,109,124,123
138   EGEN,7,1,-1
139   E,113,131,130
140   E,113,116,131
141   E,123,124,133,132
142   EGEN,7,1,-1
143   E,130,131,140,139
144   E,131,116,141
145   E,131,141,140
146   E,116,117,142,141
147   EGEN,6,1,-1
148   E,122,148,147
149   E,122,50,148
150   E,148,50,149
151   E,50,51,149
152   E,132,133,151,150
153   E,139,140,153,152
154   E,140,141,154,153
155   E,147,148,156,155
156   E,148,149,157,156
157   E,149,51,157
158   E,51,52,157
159   E,150,151,159,158
160   E,152,153,161,160
161   E,153,154,162,161
162   E,155,156,164,163
163   E,156,157,165,164
164   E,157,52,166,165
165   E,52,53,166
166   E,158,159,168,167
167   E,160,161,170,169
168   E,161,162,171,170
169   E,163,164,173,172
170   E,164,165,174,173
171   E,165,166,175,174
172   E,166,53,54,175
173   E,167,168,177,176
174   E,169,170,179,178
175   E,170,171,180,179
176   E,172,173,182,181
177   EGEN,3,1,-1
178   E,175,54,185,184
179   E,54,55,185
180   E,176,177,187,186
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
E,178,179,189,188
E,179,180,190,189
E,181,182,192,191
EGEN,4,1,-1
E,55,56,185
E,183,56,195
E,186,187,197,196
E,188,189,204,203
E,189,190,205,204
E,191,192,212,211
EGEN,4,1,-1
E,193,56,57
E,195,57,215
E,215,57,58
E,196,197,216
E,197,198,217,216
EGEN,3,1,-1
E,200,220,219
E,200,201,221,220
EGEN,3,1,-1
E,203,204,223
E,204,205,223
E,205,206,224,223
EGEN,3,1,-1
E,208,227,226
E,208,209,228,227
EGEN,3,1,-1
E,211,212,230
E,212,213,231,230
EGEN,3,1,-1
E,215,58,233
E,216,217,235,234
EGEN,3,1,-1
E,219,238,237
E,219,220,238
E,220,239,238
E,220,221,240,239
EGEN,6,1,-1
E,226,246,245
E,226,227,246
E,227,247,246
E,227,228,248,247
EGEN,6,1,-1
E,233,58,59,253
E,237,238,255,254
E,238,239,256,255
E,245,246,258,257
E,246,247,259,258
E,253,59,60,260
E,254,255,262,261
E,255,256,263,262
E,257,258,265,264
E,258,259,266,265
E,260,60,61,267
E,261,262,269,268
E,262,263,270,269
E,264,265,272,271
E,265,266,273,272
E,267,61,62,274
C*** NODE TEMPERATURES
```

********** ANSYS INPUT DATA LISTING (FILE16) **********

```
241   MP,1,TEMP,453.5
242   MP,2,TEMP,453.3
243   MP,3,TEMP,453.1
244   MP,4,TEMP,453.0
245   MP,5,TEMP,454.7
246   MP,6,TEMP,454.4
247   MP,7,TEMP,454.0
248   MP,8,TEMP,453.7
249   MP,9,TEMP,453.8
250   MP,10,TEMP,453.8
251   MP,11,TEMP,453.8
252   MP,12,TEMP,453.8
253   MP,13,TEMP,453.8
254   MP,14,TEMP,453.8
255   MP,15,TEMP,453.8
256   MP,16,TEMP,453.8
257   MP,17,TEMP,453.8
258   MP,18,TEMP,453.8
259   MP,19,TEMP,453.8
260   MP,20,TEMP,454.5
261   MP,21,TEMP,454.6
262   MP,22,TEMP,455.1
263   MP,23,TEMP,455.5
264   MP,24,TEMP,456.0
265   MP,25,TEMP,456.4
266   MP,26,TEMP,456.7
267   MP,27,TEMP,456.0
268   MP,28,TEMP,455.0
269   MP,29,TEMP,455.0
270   MP,30,TEMP,455.0
271   MP,31,TEMP,455.0
272   MP,63,TEMP,520.6
273   MP,64,TEMP,523.2
274   MP,65,TEMP,523.2
275   MP,66,TEMP,520.1
276   MP,67,TEMP,519.9
277   MP,68,TEMP,515.2
278   MP,69,TEMP,504.2
279   MP,70,TEMP,502.6
280   MP,71,TEMP,522.0
281   MP,72,TEMP,523.5
282   MP,73,TEMP,504.2
283   MP,82,TEMP,544.3
284   MP,83,TEMP,544.5
285   MP,84,TEMP,524.4
286   MP,98,TEMP,539.4
287   MP,99,TEMP,537.6
288   MP,100,TEMP,536.7
289   MP,108,TEMP,560.8
290   MP,109,TEMP,537.8
291   MP,110,TEMP,537.8
292   MP,111,TEMP,536.2
293   MP,  2,TEMP,536.0
294   MP,  3,TEMP,550.6
295   MP,  4,TEMP,537.1
296   MP,115,TEMP,536.6
297   MP,132,TEMP,598.2
298   MP,133,TEMP,606.3
299   MP,134,TEMP,606.4
300   MP,135,TEMP,605.0
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
301   MT,136,TEMP,604.8
302   MT,137,TEMP,601.7
303   MT,138,TEMP,594.3
304   MT,139,TEMP,593.8
305   MT,141,TEMP,567.1
306   MT,142,TEMP,567.8
307   MT,143,TEMP,555.5
308   MT,144,TEMP,554.9
309   MT,145,TEMP,545.3
310   MT,146,TEMP,529.6
311   MT,147,TEMP,528.9
312   MT,150,TEMP,601.2
313   MT,151,TEMP,606.6
314   MT,152,TEMP,594.4
315   MT,154,TEMP,568.3
316   MT,155,TEMP,529.6
317   MT,167,TEMP,615.9
318   MT,168,TEMP,616.3
319   MT,169,TEMP,606.9
320   MT,171,TEMP,582.2
321   MT,172,TEMP,539.7
322   MT,186,TEMP,619.3
323   MT,187,TEMP,619.6
324   MT,188,TEMP,610.7
325   MT,190,TEMP,587.5
326   MT,191,TEMP,544.5
327   MT,196,TEMP,619.3
328   MT,197,TEMP,619.6
329   MT,198,TEMP,619.6
330   MT,199,TEMP,618.8
331   MT,200,TEMP,618.7
332   MT,201,TEMP,616.6
333   MT,202,TEMP,616.4
334   MT,203,TEMP,610.5
335   MT,205,TEMP,587.8
336   MT,206,TEMP,587.4
337   MT,207,TEMP,578.5
338   MT,208,TEMP,578.0
339   MT,209,TEMP,568.1
340   MT,210,TEMP,545.1
341   MT,211,TEMP,543.9
342   MT,234,TEMP,637.0
343   MT,235,TEMP,637.0
344   MT,236,TEMP,636.0
345   MT,237,TEMP,635.7
346   MT,239,TEMP,625.9
347   MT,240,TEMP,625.7
348   MT,241,TEMP,621.9
349   MT,242,TEMP,621.7
350   MT,243,TEMP,617.7
351   MT,244,TEMP,610.5
352   MT,245,TEMP,610.0
353   MT,247,TEMP,580.9
354   MT,248,TEMP,580.4
355   MT,249,TEMP,567.2
356   MT,250,TEMP,566.6
357   MT,251,TEMP,552.2
358   MT,252,TEMP,538.6
359   MT,253,TEMP,538.4
360   MT,254,TEMP,636.0
```

********** ANSYS INPUT DATA LISTING (FILE16) **********

```
361   NT,256,TEMP,623.9
362   NT,257,TEMP,618.5
363   NT,259,TEMP,580.5
364   NT,260,TEMP,538.3
365   NT,261,TEMP,636.9
366   NT,263,TEMP,627.6
367   NT,264,TEMP,612.7
368   NT,266,TEMP,584.3
369   NT,267,TEMP,539.4
370   NT,268,TEMP,637.7
371   NT,270,TEMP,627.9
372   NT,271,TEMP,614.5
373   NT,273,TEMP,584.7
374   NT,274,TEMP,539.6
375   ITER,-20,,20
376   AFWRITE
377   FINI
378   /INPUT,27
379   FINI
380   /PREP7
381   RESUME
382   KAN,0
383   ET,2,42,,,3
384   R,1,2.0
385   TREF,70
386   KTEMP,1,20
387   REAL,1
388   TYPE,2
389   EMODIF,ALL,0
390   SYMBC,,0,0
391   SYMBC,,2,0
392   D,234,UZ,0.0
393   ITER,1,,1
394   AFWRITE
395   FINI
396   /INPUT,27
397   FINI
398   /POST1
399   SET,1,1
400   PLNSTR,SI
401   PRDISP
402   /SHOW,PLOTS,,1
403   PLNSTR,TEMP
404   PLNSTR,SI
405   FINI
406   /EOF
```

SPACER DISK THERMAL STRESS ANALYSIS, ACCIDENT CONDITIONS 10.7935 MAY 1,1990 CP= 264.520

***** POST1 NODAL STRESS LISTING *****

LOAD STEP 1 ITERATION= 1 SECTION= 1
TIME= 0.00000E+00 LOAD CASE= 1

THE FOLLOWING X,Y,Z STRESSES ARE IN GLOBAL COORDINATES

NODE	SX	SY	SZ	SXY	SYZ	SXZ	SIG1	SIG2	SIG3	SI	SIGE
1	0.2868E+05	13.57	0.0000E+00	558.7	0.0000E+00	0.0000E+00	0.2869E+05	2.690	0.0000E+00	0.2869E+05	0.2869E+05
2	0.2767E+05	-351.7	0.0000E+00	1565.	0.0000E+00	0.0000E+00	0.2779E+05	0.0000E+00	-673.3	0.2847E+05	0.2814E+05
3	0.2535E+05	-197.8	0.0000E+00	3301.	0.0000E+00	0.0000E+00	0.2580E+05	0.0000E+00	-649.6	0.2645E+05	0.2614E+05
4	0.2254E+05	834.4	0.0000E+00	4115.	0.0000E+00	0.0000E+00	0.2330E+05	249.9	-177.4	0.2347E+05	0.2326E+05
5	0.1936E+05	472.7	0.0000E+00	4628.	0.0000E+00	0.0000E+00	0.2065E+05	0.0000E+00	-618.3	0.2107E+05	0.2077E+05
6	0.1729E+05	2104.	0.0000E+00	4478.	0.0000E+00	0.0000E+00	0.1851E+05	881.4	0.0000E+00	0.1851E+05	0.1809E+05
7	0.1421E+05	-29.21	0.0000E+00	4334.	0.0000E+00	0.0000E+00	0.1543E+05	246.5	-1491.	0.1692E+05	0.1614E+05
8	0.1939E+05	3970.	0.0000E+00	6177.	0.0000E+00	0.0000E+00	0.2160E+05	1769.	0.0000E+00	0.2160E+05	0.2081E+05
9	0.1859E+05	2027.	0.0000E+00	9742.	0.0000E+00	0.0000E+00	0.2324E+05	0.0000E+00	-2628.	0.2587E+05	0.2468E+05
10	0.1559E+05	5370.	0.0000E+00	9009.	0.0000E+00	0.0000E+00	0.2084E+05	236.1	-119.4	0.2096E+05	0.2078E+05
11	0.1133E+05	4394.	0.0000E+00	7186.	0.0000E+00	0.0000E+00	0.1584E+05	76.23	-197.9	0.1604E+05	0.1591E+05
12	9290.	4254.	0.0000E+00	6429.	0.0000E+00	0.0000E+00	0.1368E+05	28.78	-160.2	0.1384E+05	0.1375E+05
13	7944.	4442.	0.0000E+00	6077.	0.0000E+00	0.0000E+00	0.1252E+05	12.24	-158.4	0.1267E+05	0.1259E+05
14	6996.	4718.	0.0000E+00	5841.	0.0000E+00	0.0000E+00	0.1181E+05	3.794	-102.6	0.1192E+05	0.1186E+05
15	6414.	5151.	0.0000E+00	5838.	0.0000E+00	0.0000E+00	0.1166E+05	0.0000E+00	-95.56	0.1176E+05	0.1171E+05
16	5822.	5762.	0.0000E+00	6021.	0.0000E+00	0.0000E+00	0.1182E+05	0.0000E+00	-239.3	0.1206E+05	0.1195E+05
17	5462.	6591.	0.0000E+00	6022.	0.0000E+00	0.0000E+00	0.1208E+05	23.59	-52.26	0.1213E+05	0.1209E+05
18	4857.	7307.	0.0000E+00	6158.	0.0000E+00	0.0000E+00	0.1237E+05	0.0000E+00	-209.3	0.1258E+05	0.1248E+05
19	4328.	8272.	0.0000E+00	6045.	0.0000E+00	0.0000E+00	0.1267E+05	0.0000E+00	-67.91	0.1274E+05	0.1270E+05
20	3684.	8838.	0.0000E+00	5847.	0.0000E+00	0.0000E+00	0.1266E+05	27.18	-162.0	0.1282E+05	0.1273E+05
21	3065.	9436.	0.0000E+00	5624.	0.0000E+00	0.0000E+00	0.1272E+05	0.0000E+00	-222.1	0.1295E+05	0.1284E+05
22	2692.	0.1026E+05	0.0000E+00	5392.	0.0000E+00	0.0000E+00	0.1307E+05	0.0000E+00	-117.1	0.1319E+05	0.1313E+05
23	2231.	0.1128E+05	0.0000E+00	5285.	0.0000E+00	0.0000E+00	0.1373E+05	0.0000E+00	-194.3	0.1392E+05	0.1382E+05
24	1945.	0.1257E+05	0.0000E+00	5134.	0.0000E+00	0.0000E+00	0.1465E+05	0.0000E+00	-138.1	0.1479E+05	0.1472E+05
25	1577.	0.1435E+05	0.0000E+00	5130.	0.0000E+00	0.0000E+00	0.1616E+05	0.0000E+00	-236.8	0.1640E+05	0.1628E+05
26	1431.	0.1725E+05	0.0000E+00	5261.	0.0000E+00	0.0000E+00	0.1885E+05	0.0000E+00	-148.9	0.1900E+05	0.1893E+05
27	585.2	0.2035E+05	0.0000E+00	4775.	0.0000E+00	0.0000E+00	0.2149E+05	0.0000E+00	-555.9	0.2205E+05	0.2177E+05
28	-77.60	0.2056E+05	0.0000E+00	3013.	0.0000E+00	0.0000E+00	0.2103E+05	0.0000E+00	-539.2	0.2156E+05	0.2130E+05
29	-83.24	0.1908E+05	0.0000E+00	1441.	0.0000E+00	0.0000E+00	0.1921E+05	97.01	-304.4	0.1951E+05	0.1931E+05
30	118.5	0.1686E+05	0.0000E+00	546.2	0.0000E+00	0.0000E+00	0.1688E+05	110.2	-11.33	0.1689E+05	0.1683E+05
31	-227.8	0.1590E+05	0.0000E+00	350.2	0.0000E+00	0.0000E+00	0.1591E+05	0.0000E+00	-233.4	0.1614E+05	0.1603E+05
32	0.1400E+05	3016.	0.0000E+00	980.0	0.0000E+00	0.0000E+00	0.1414E+05	2872.	0.0000E+00	0.1414E+05	0.1318E+05
33	0.1723E+05	241.8	0.0000E+00	2072.	0.0000E+00	0.0000E+00	0.1756E+05	979.9	-1072.	0.1863E+05	0.1774E+05
34	0.1694E+05	182.9	0.0000E+00	2473.	0.0000E+00	0.0000E+00	0.1731E+05	162.8	-353.8	0.1766E+05	0.1741E+05
35	0.1480E+05	441.3	0.0000E+00	2739.	0.0000E+00	0.0000E+00	0.1531E+05	234.2	-302.7	0.1561E+05	0.1536E+05
36	0.1465E+05	451.8	0.0000E+00	3078.	0.0000E+00	0.0000E+00	0.1531E+05	386.7	-596.3	0.1591E+05	0.1544E+05
37	0.1572E+05	1224.	0.0000E+00	3436.	0.0000E+00	0.0000E+00	0.1653E+05	1082.	-663.7	0.1719E+05	0.1640E+05
38	0.2446E+05	1373.	0.0000E+00	4646.	0.0000E+00	0.0000E+00	0.2563E+05	1192.	-991.7	0.2662E+05	0.2564E+05
40	0.1401E+05	3377.	0.0000E+00	6735.	0.0000E+00	0.0000E+00	0.1751E+05	719.5	-840.9	0.1835E+05	0.1763E+05
41	9600.	4801.	0.0000E+00	5754.	0.0000E+00	0.0000E+00	0.1344E+05	1044.	-89.40	0.1353E+05	0.1301E+05
42	8883.	3733.	0.0000E+00	6086.	0.0000E+00	0.0000E+00	0.1294E+05	223.7	-544.9	0.1348E+05	0.1312E+05
43	8005.	4424.	0.0000E+00	5557.	0.0000E+00	0.0000E+00	0.1206E+05	435.7	-71.03	0.1214E+05	0.1189E+05
44	7410.	5022.	0.0000E+00	5096.	0.0000E+00	0.0000E+00	0.1146E+05	1021.	-47.44	0.1151E+05	0.1104E+05

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SPACER DISK THERMAL STRESS ANALYSIS, ACCIDENT CONDITIONS 10.7936 MAY 1,1990 CP= 265.400

***** POST1 NODAL STRESS LISTING *****

LOAD STEP 1 ITERATION= 1 SECTION= 1
TIME= 0.00000E+00 LOAD CASE= 1

THE FOLLOWING X,Y,Z STRESSES ARE IN GLOBAL COORDINATES

NODE	SX	SY	SZ	SEY	SYZ	SXZ	SIG1	SIG2	SIG3	SI	SIGE
45	6463.	4843.	0.0000E+00	4638.	0.0000E+00	0.0000E+00	0.1037E+05	967.8	-26.75	0.1039E+05	9973.
46	6616.	5463.	0.0000E+00	4767.	0.0000E+00	0.0000E+00	0.1085E+05	1266.	-31.90	0.1088E+05	0.1033E+05
47	6244.	6320.	0.0000E+00	4733.	0.0000E+00	0.0000E+00	0.1104E+05	1396.	-67.68	0.1110E+05	0.1043E+05
48	5044.	5903.	0.0000E+00	5027.	0.0000E+00	0.0000E+00	0.1053E+05	470.8	-49.88	0.1058E+05	0.1033E+05
49	5623.	7078.	0.0000E+00	4858.	0.0000E+00	0.0000E+00	0.1129E+05	1537.	-129.3	0.1142E+05	0.1079E+05
50	6377.	8685.	0.0000E+00	4614.	0.0000E+00	0.0000E+00	0.1236E+05	2789.	-90.39	0.1245E+05	0.1144E+05
51	4434.	8148.	0.0000E+00	4529.	0.0000E+00	0.0000E+00	0.1120E+05	1437.	-40.53	0.1125E+05	0.1063E+05
52	3266.	8185.	0.0000E+00	4460.	0.0000E+00	0.0000E+00	0.1083E+05	689.3	-67.74	0.1090E+05	0.1037E+05
53	2176.	8361.	0.0000E+00	4611.	0.0000E+00	0.0000E+00	0.1099E+05	212.7	-463.4	0.1145E+05	0.1115E+05
54	2317.	9433.	0.0000E+00	4363.	0.0000E+00	0.0000E+00	0.1168E+05	354.2	-79.63	0.1175E+05	0.1135E+05
55	2237.	0.1073E+05	0.0000E+00	4530.	0.0000E+00	0.0000E+00	0.1271E+05	359.4	-77.80	0.1278E+05	0.1257E+05
56	2706.	0.1184E+05	0.0000E+00	4514.	0.0000E+00	0.0000E+00	0.1371E+05	929.4	-101.6	0.1382E+05	0.1333E+05
57	3390.	0.1300E+05	0.0000E+00	4173.	0.0000E+00	0.0000E+00	0.1460E+05	1887.	-91.14	0.1469E+05	0.1386E+05
58	885.8	0.1352E+05	0.0000E+00	3403.	0.0000E+00	0.0000E+00	0.1448E+05	1130.	-1211.	0.1569E+05	0.1471E+05
59	-1426.	0.1391E+05	0.0000E+00	1640.	0.0000E+00	0.0000E+00	0.1617E+05	0.0000E+00	-1680.	0.1785E+05	0.1712E+05
60	89.38	0.1413E+05	0.0000E+00	482.3	0.0000E+00	0.0000E+00	0.1417E+05	243.4	-192.6	0.1436E+05	0.1415E+05
61	25.16	0.1321E+05	0.0000E+00	171.7	0.0000E+00	0.0000E+00	0.1321E+05	116.8	-93.15	0.1331E+05	0.1320E+05
62	-137.7	0.1301E+05	0.0000E+00	125.9	0.0000E+00	0.0000E+00	0.1301E+05	0.0000E+00	-140.5	0.1315E+05	0.1309E+05
63	-6228.	-9253.	0.0000E+00	491.3	0.0000E+00	0.0000E+00	0.0000E+00	-6142.	-9339.	9339.	8253.
64	-6209.	-8911.	0.0000E+00	1502.	0.0000E+00	0.0000E+00	413.4	-3830.	-0.1171E+05	0.1212E+05	0.1104E+05
65	-9123.	-26.20	0.0000E+00	1323.	0.0000E+00	0.0000E+00	409.1	-226.4	-9334.	9743.	9441.
66	-3126.	27.24	0.0000E+00	1242.	0.0000E+00	0.0000E+00	770.7	0.0000E+00	-3870.	4641.	4309.
67	1968.	-210.7	0.0000E+00	1347.	0.0000E+00	0.0000E+00	3243.	0.0000E+00	-1485.	4728.	4208.
68	9348.	-736.7	0.0000E+00	2331.	0.0000E+00	0.0000E+00	9894.	188.6	-1471.	0.1137E+05	0.1065E+05
69	0.2458E+05	223.6	0.0000E+00	2157.	0.0000E+00	0.0000E+00	0.2478E+05	2464.	-2491.	0.2721E+05	0.2517E+05
70	0.2060E+05	-2616.	0.0000E+00	6355.	0.0000E+00	0.0000E+00	0.2260E+05	0.0000E+00	-4620.	0.2722E+05	0.2549E+05
71	1412.	-8629.	0.0000E+00	94.64	0.0000E+00	0.0000E+00	1426.	0.0000E+00	-8637.	0.1006E+05	9431.
72	1348.	-9174.	0.0000E+00	94.64	0.0000E+00	0.0000E+00	1360.	0.0000E+00	-9186.	0.1059E+05	9937.
73	-139.2	-0.1030E+05	0.0000E+00	2127.	0.0000E+00	0.0000E+00	2396.	-1668.	-0.1137E+05	0.1397E+05	0.1250E+05
74	1470.	-399.8	0.0000E+00	3223.	0.0000E+00	0.0000E+00	4208.	0.0000E+00	-3337.	7545.	6803.
76	-293.8	-9123.	0.0000E+00	-43.75	0.0000E+00	0.0000E+00	0.0000E+00	-288.6	-9128.	9128.	8987.
77	-92.06	-8673.	0.0000E+00	-43.75	0.0000E+00	0.0000E+00	0.0000E+00	-86.54	-8680.	8680.	8637.
78	2031.	-0.1156E+05	0.0000E+00	-389.3	0.0000E+00	0.0000E+00	2044.	0.0000E+00	-0.1157E+05	0.1361E+05	0.1271E+05
79	328.0	-2992.	0.0000E+00	864.8	0.0000E+00	0.0000E+00	1483.	-333.0	-3814.	5298.	4923.
80	1825.	1772.	0.0000E+00	3032.	0.0000E+00	0.0000E+00	4880.	108.7	-1392.	6272.	5686.
81	4320.	3212.	0.0000E+00	4602.	0.0000E+00	0.0000E+00	8346.	322.4	-1138.	9484.	9082.
82	-85.03	-8736.	0.0000E+00	9.882	0.0000E+00	0.0000E+00	0.0000E+00	-82.23	-9064.	9064.	9007.
83	-119.8	-9062.	0.0000E+00	9.882	0.0000E+00	0.0000E+00	0.0000E+00	-117.1	-9064.	9064.	9007.
84	-1444.	-0.1149E+05	0.0000E+00	-416.7	0.0000E+00	0.0000E+00	0.0000E+00	-1426.	-0.1151E+05	0.1151E+05	0.1087E+05
85	549.1	-4416.	0.0000E+00	-116.2	0.0000E+00	0.0000E+00	649.2	-66.06	-4450.	5099.	4792.
86	735.7	184.1	0.0000E+00	1127.	0.0000E+00	0.0000E+00	1876.	0.0000E+00	-956.4	2833.	2574.
87	1351.	1558.	0.0000E+00	2676.	0.0000E+00	0.0000E+00	4235.	68.80	-1215.	5470.	5018.
88	3106.	2040.	0.0000E+00	4026.	0.0000E+00	0.0000E+00	6640.	10.67	-1505.	8145.	7392.

ANSYS - ENGINEERING ANALYSIS SYSTEM REVISION 4.4 NUCLEAR PACK MAY 1,1989
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FOR SUPPORT CALL STEVE PORTER PHONE (206) 874-2233 TWX

SPACER DISK THERMAL STRESS ANALYSIS, ACCIDENT CONDITIONS 10.7941 MAY 1,1990 CP= 266.610

***** POST1 NODAL STRESS LISTING *****

LOAD STEP 1 ITERATION= 1 SECTION= 1
TIME= 0.00000E+00 LOAD CASE= 1

THE FOLLOWING X,Y,Z STRESSES ARE IN GLOBAL COORDINATES

NODE	SX	SY	SZ	SXY	SYZ	SXZ	SIG1	SIG2	SIG3	SI	SIGE
132	-5930.	-6949.	0.0000E+00	837.6	0.0000E+00	0.0000E+00	0.0000E+00	-5432.	-7447.	7447.	6694.
133	-0.1078E+05	-6771.	0.0000E+00	784.4	0.0000E+00	0.0000E+00	0.0000E+00	-5159.	-0.1239E+05	0.1239E+05	0.1094E+05
134	-0.1712E+05	1143.	0.0000E+00	317.4	0.0000E+00	0.0000E+00	1153.	0.0000E+00	-0.1713E+05	0.1829E+05	0.1774E+05
135	-0.1494E+05	-112.4	0.0000E+00	191.6	0.0000E+00	0.0000E+00	24.13	-130.1	-0.1494E+05	0.1497E+05	0.1489E+05
136	-0.1339E+05	-6.202	0.0000E+00	234.3	0.0000E+00	0.0000E+00	108.5	-108.2	-0.1340E+05	0.1350E+05	0.1340E+05
137	-0.1118E+05	-110.5	0.0000E+00	287.6	0.0000E+00	0.0000E+00	77.64	-173.7	-0.1119E+05	0.1127E+05	0.1115E+05
138	-9560.	1056.	0.0000E+00	131.1	0.0000E+00	0.0000E+00	1073.	0.0000E+00	-9577.	0.1065E+05	0.1016E+05
139	-6485.	-6804.	0.0000E+00	-850.8	0.0000E+00	0.0000E+00	0.0000E+00	-4294.	-8993.	8993.	7794.
140	-3553.	-9552.	0.0000E+00	67.60	0.0000E+00	0.0000E+00	0.0000E+00	-3285.	-9820.	9820.	8722.
141	-4456.	-0.1114E+05	0.0000E+00	1615.	0.0000E+00	0.0000E+00	0.0000E+00	-3918.	-0.1168E+05	0.1168E+05	0.1032E+05
142	-3868.	171.5	0.0000E+00	587.8	0.0000E+00	0.0000E+00	463.6	0.0000E+00	-4160.	4624.	4411.
143	-2482.	469.6	0.0000E+00	-371.9	0.0000E+00	0.0000E+00	534.9	0.0000E+00	-2548.	3082.	2864.
144	-4344.	-101.9	0.0000E+00	-102.9	0.0000E+00	0.0000E+00	80.43	-173.6	-4531.	4631.	4509.
145	-4617.	47.93	0.0000E+00	267.6	0.0000E+00	0.0000E+00	73.70	0.0000E+00	-4644.	4720.	4683.
146	-1142.	1227.	0.0000E+00	1351.	0.0000E+00	0.0000E+00	2238.	0.0000E+00	-2153.	4392.	4209.
147	-1060.	63.41	0.0000E+00	1842.	0.0000E+00	0.0000E+00	1885.	-416.7	-2664.	4549.	3925.
148	-363.2	837.2	0.0000E+00	3118.	0.0000E+00	0.0000E+00	3491.	419.4	-3438.	6929.	6395.
149	3126.	5285.	0.0000E+00	4239.	0.0000E+00	0.0000E+00	8644.	385.3	-618.6	9263.	8810.
150	1593.	-8434.	0.0000E+00	169.0	0.0000E+00	0.0000E+00	1630.	0.0000E+00	-8472.	0.1010E+05	9395.
151	1265.	-0.1025E+05	0.0000E+00	169.0	0.0000E+00	0.0000E+00	1294.	0.0000E+00	-0.1028E+05	0.1137E+05	0.1098E+05
152	347.4	-9555.	0.0000E+00	133.8	0.0000E+00	0.0000E+00	737.3	-378.6	-9594.	0.1035E+05	9843.
153	336.5	-0.1218E+05	0.0000E+00	303.3	0.0000E+00	0.0000E+00	481.4	-103.9	-0.1222E+05	0.1270E+05	0.1243E+05
154	2070.	-0.1506E+05	0.0000E+00	474.9	0.0000E+00	0.0000E+00	2101.	0.0000E+00	-0.1509E+05	0.1719E+05	0.1626E+05
155	-531.7	-918.3	0.0000E+00	1075.	0.0000E+00	0.0000E+00	2142.	-945.3	-2647.	4789.	4405.
156	713.4	1199.	0.0000E+00	1975.	0.0000E+00	0.0000E+00	3004.	118.4	-1208.	4212.	3812.
157	59.71	3107.	0.0000E+00	3686.	0.0000E+00	0.0000E+00	5583.	113.8	-2530.	8114.	7293.
158	-458.4	-9895.	0.0000E+00	-41.92	0.0000E+00	0.0000E+00	-445.0	-9908.	9908.	9695.	
159	230.0	-8786.	0.0000E+00	-41.92	0.0000E+00	0.0000E+00	244.3	0.0000E+00	-8801.	9045.	8927.
160	1401.	-9407.	0.0000E+00	334.4	0.0000E+00	0.0000E+00	1430.	0.0000E+00	-9436.	0.1087E+05	0.1023E+05
161	155.7	-0.1257E+05	0.0000E+00	303.3	0.0000E+00	0.0000E+00	740.0	-565.3	-0.1259E+05	0.1333E+05	0.1273E+05
162	-1390.	-0.1443E+05	0.0000E+00	256.2	0.0000E+00	0.0000E+00	0.0000E+00	-1373.	-0.1446E+05	0.1444E+05	0.1381E+05
163	1830.	-2614.	0.0000E+00	275.5	0.0000E+00	0.0000E+00	1855.	0.0000E+00	-2640.	4495.	3919.
164	-76.58	-1952.	0.0000E+00	1024.	0.0000E+00	0.0000E+00	1158.	-613.4	-2573.	3732.	3321.
165	665.7	2567.	0.0000E+00	2646.	0.0000E+00	0.0000E+00	4466.	0.0000E+00	-1234.	5700.	5204.
166	1384.	6051.	0.0000E+00	3784.	0.0000E+00	0.0000E+00	8174.	198.1	-936.8	9111.	8636.
167	-28.84	-8964.	0.0000E+00	-24.01	0.0000E+00	0.0000E+00	14.13	-30.20	-8977.	8991.	8969.
168	-213.0	-9717.	0.0000E+00	-24.01	0.0000E+00	0.0000E+00	0.0000E+00	-201.0	-9729.	9729.	9630.
169	-1504.	-0.1513E+05	0.0000E+00	363.4	0.0000E+00	0.0000E+00	0.0000E+00	-1485.	-0.1515E+05	0.1515E+05	0.1446E+05
170	-133.6	-0.1181E+05	0.0000E+00	303.3	0.0000E+00	0.0000E+00	607.5	-719.0	-0.1183E+05	0.1244E+05	0.1183E+05
171	1106.	-0.1023E+05	0.0000E+00	247.2	0.0000E+00	0.0000E+00	1124.	0.0000E+00	-0.1025E+05	0.1137E+05	0.1085E+05
172	-1725.	-7013.	0.0000E+00	246.5	0.0000E+00	0.0000E+00	0.0000E+00	-1711.	-7029.	7029.	6349.
173	580.1	-2518.	0.0000E+00	623.7	0.0000E+00	0.0000E+00	913.8	-155.9	-2696.	3610.	3292.
174	811.8	1332.	0.0000E+00	1820.	0.0000E+00	0.0000E+00	2963.	0.0000E+00	-818.8	3782.	3485.

ANSYS - ENGINEERING ANALYSIS SYSTEM REVISION 4.4 NUCLEAR PACK MAY 1,1989

FOR SUPPORT CALL STEVE PORTER PHONE (206) 874-2235 TWX

SPACER DISK THERMAL STRESS ANALYSIS, ACCIDENT CONDITIONS 10.7943 MAY 1,1990 CP= 267.210

***** POST1 NODAL STRESS LISTING *****

LOAD STEP 1 ITERATION= 1 SECTION= 1
TIME= 0.00000E+00 LOAD CASE= 1

THE FOLLOWING X,Y,Z STRESSES ARE IN GLOBAL COORDINATES

NODE	SX	SY	SZ	SXY	SYZ	SXZ	SIG1	SIG2	SIG3	SI	SIGE
175	818.1	4747.	0.0000E+00	3261.	0.0000E+00	0.0000E+00	6612.	0.0000E+00	-1048.	7660.	7212.
176	-252.2	-9764.	0.0000E+00	112.8	0.0000E+00	0.0000E+00	0.0000E+00	-228.1	-9788.	9788.	9676.
177	-169.1	-8918.	0.0000E+00	112.8	0.0000E+00	0.0000E+00	0.0000E+00	-140.7	-8946.	8946.	8877.
178	888.6	-0.1383E+05	0.0000E+00	128.8	0.0000E+00	0.0000E+00	916.4	0.0000E+00	-0.1388E+05	0.1480E+05	0.1436E+05
179	-424.7	-0.1279E+05	0.0000E+00	303.3	0.0000E+00	0.0000E+00	486.8	-871.6	-0.1283E+05	0.1332E+05	0.1269E+05
180	-1501.	-9341.	0.0000E+00	481.8	0.0000E+00	0.0000E+00	0.0000E+00	-1396.	-9647.	9647.	9030.
181	1279.	-3427.	0.0000E+00	-222.3	0.0000E+00	0.0000E+00	1390.	0.0000E+00	-3538.	4929.	4404.
182	-122.8	-5024.	0.0000E+00	276.5	0.0000E+00	0.0000E+00	641.7	-665.9	-5123.	5764.	5269.
183	553.0	-560.3	0.0000E+00	1390.	0.0000E+00	0.0000E+00	1525.	0.0000E+00	-1532.	3057.	2664.
184	1001.	3747.	0.0000E+00	2709.	0.0000E+00	0.0000E+00	5435.	0.0000E+00	-686.8	6122.	5816.
185	563.7	7877.	0.0000E+00	4095.	0.0000E+00	0.0000E+00	9715.	0.0000E+00	-1273.	0.1099E+05	0.1044E+05
186	2119.	-9089.	0.0000E+00	-194.7	0.0000E+00	0.0000E+00	2181.	0.0000E+00	-9151.	0.1133E+05	0.1042E+05
187	2081.	-9393.	0.0000E+00	-194.7	0.0000E+00	0.0000E+00	2134.	0.0000E+00	-9645.	0.1178E+05	0.1087E+05
188	2682.	-0.1892E+05	0.0000E+00	575.6	0.0000E+00	0.0000E+00	2745.	0.0000E+00	-0.1898E+05	0.2172E+05	0.2049E+05
189	3274.	-0.1189E+05	0.0000E+00	303.3	0.0000E+00	0.0000E+00	3367.	0.0000E+00	-0.1199E+05	0.1535E+05	0.1402E+05
190	3340.	-6268.	0.0000E+00	34.83	0.0000E+00	0.0000E+00	3462.	0.0000E+00	-6390.	9852.	8702.
191	519.3	-8784.	0.0000E+00	1114.	0.0000E+00	0.0000E+00	925.2	0.0000E+00	-9190.	0.1011E+05	9702.
192	604.1	-4694.	0.0000E+00	1117.	0.0000E+00	0.0000E+00	1543.	-417.8	-5215.	6757.	6073.
193	-843.6	-501.0	0.0000E+00	1037.	0.0000E+00	0.0000E+00	512.7	-62.96	-1794.	2307.	2089.
194	-296.0	2119.	0.0000E+00	1626.	0.0000E+00	0.0000E+00	3063.	0.0000E+00	-1242.	4307.	3857.
195	-611.3	6111.	0.0000E+00	3519.	0.0000E+00	0.0000E+00	7634.	0.0000E+00	-2134.	9768.	8967.
196	-9093.	-5204.	0.0000E+00	-1308.	0.0000E+00	0.0000E+00	-4801.	-9496.	9496.	8476.
197	-0.1181E+05	-6047.	0.0000E+00	-1490.	0.0000E+00	0.0000E+00	-5301.	-0.1238E+05	0.1238E+05	0.1142E+05
198	-7205.	20.43	0.0000E+00	-3663.	0.0000E+00	0.0000E+00	2277.	0.0000E+00	-9461.	0.1174E+05	0.1124E+05
199	3852.	479.1	0.0000E+00	-2798.	0.0000E+00	0.0000E+00	7504.	0.0000E+00	-1173.	8676.	8257.
200	4061.	-1528.	0.0000E+00	473.2	0.0000E+00	0.0000E+00	5791.	0.0000E+00	-3258.	9048.	8132.
201	1554.	569.5	0.0000E+00	3698.	0.0000E+00	0.0000E+00	6194.	0.0000E+00	-4071.	0.1027E+05	9445.
202	-0.1650E+05	-48.60	0.0000E+00	5039.	0.0000E+00	0.0000E+00	1600.	0.0000E+00	-0.1815E+05	0.1975E+05	0.1915E+05
203	-0.2008E+05	-0.1167E+05	0.0000E+00	1733.	0.0000E+00	0.0000E+00	0.0000E+00	-9531.	-0.2223E+05	0.2223E+05	0.1983E+05
204	-0.1377E+05	-6994.	0.0000E+00	-260.5	0.0000E+00	0.0000E+00	0.0000E+00	-6537.	-0.1423E+05	0.1423E+05	0.1266E+05
205	-0.1602E+05	-3481.	0.0000E+00	-2462.	0.0000E+00	0.0000E+00	329.3	-3299.	-0.1633E+05	0.1686E+05	0.1570E+05
206	-0.1397E+05	-763.2	0.0000E+00	-4432.	0.0000E+00	0.0000E+00	1304.	-265.6	-0.1577E+05	0.1707E+05	0.1647E+05
207	4226.	1003.	0.0000E+00	-3731.	0.0000E+00	0.0000E+00	7755.	0.0000E+00	-2525.	0.1028E+05	9671.
208	4856.	-1480.	0.0000E+00	38.93	0.0000E+00	0.0000E+00	6381.	0.0000E+00	-3004.	9385.	8446.
209	4380.	-346.7	0.0000E+00	2920.	0.0000E+00	0.0000E+00	6434.	0.0000E+00	-2401.	8835.	8260.
210	-8866.	598.8	0.0000E+00	4127.	0.0000E+00	0.0000E+00	2695.	0.0000E+00	-0.1096E+05	0.1366E+05	0.1321E+05
211	-0.1323E+05	-6557.	0.0000E+00	2066.	0.0000E+00	0.0000E+00	0.0000E+00	-5034.	-0.1475E+05	0.1475E+05	0.1313E+05
212	-8497.	-3579.	0.0000E+00	1078.	0.0000E+00	0.0000E+00	0.0000E+00	-3031.	-9046.	9046.	8005.
213	-5439.	36.45	0.0000E+00	-339.2	0.0000E+00	0.0000E+00	311.8	-222.3	-5693.	6204.	5891.
214	-2168.	529.4	0.0000E+00	-30.60	0.0000E+00	0.0000E+00	958.2	-8.572	-2588.	3547.	3273.
215	-3013.	3552.	0.0000E+00	2530.	0.0000E+00	0.0000E+00	4538.	0.0000E+00	-4000.	8538.	7517.
216	-8304.	-3717.	0.0000E+00	-1619.	0.0000E+00	0.0000E+00	0.0000E+00	-3170.	-8852.	8852.	7859.
217	-8506.	-611.8	0.0000E+00	-3001.	0.0000E+00	0.0000E+00	798.9	-283.8	-9633.	0.1043E+05	9947.

SPACER DISK THERMAL STRESS ANALYSIS, ACCIDENT CONDITIONS 10.7945 MAY 1,1990 CP= 267.820

***** POST1 NODAL STRESS LISTING *****

LOAD STEP 1 ITERATION= 1 SECTION= 1
TIME= 0.00000E+00 LOAD CASE= 1

THE FOLLOWING X,Y,Z STRESSES ARE IN GLOBAL COORDINATES

NODE	SX	SY	SZ	SXY	SYZ	SXZ	SIG1	SIG2	SIG3	SI	SIGE
218	-8784.	933.3	0.0000E+00	-3118.	0.0000E+00	0.0000E+00	1897.	0.0000E+00	-9748.	0.1165E+05	0.1084E+05
219	-7678.	-3022.	0.0000E+00	-847.3	0.0000E+00	0.0000E+00	0.0000E+00	-2427.	-8273.	8273.	7522.
220	-7267.	-2828.	0.0000E+00	1633.	0.0000E+00	0.0000E+00	0.0000E+00	-1960.	-8135.	8135.	7480.
221	-9146.	1294.	0.0000E+00	4138.	0.0000E+00	0.0000E+00	2818.	0.0000E+00	-0.1067E+05	0.1349E+05	0.1235E+05
222	-8193.	-1324.	0.0000E+00	3978.	0.0000E+00	0.0000E+00	1476.	-708.3	-0.1029E+05	0.1176E+05	0.1086E+05
223	-9146.	-4398.	0.0000E+00	-611.8	0.0000E+00	0.0000E+00	0.0000E+00	-3429.	-0.1031E+05	0.1031E+05	9200.
224	-7903.	-477.8	0.0000E+00	-3787.	0.0000E+00	0.0000E+00	1441.	-209.9	-9613.	0.1105E+05	0.1036E+05
225	-8998.	913.1	0.0000E+00	-4032.	0.0000E+00	0.0000E+00	2423.	0.0000E+00	-0.1051E+05	0.1293E+05	0.1193E+05
226	-7553.	-3709.	0.0000E+00	-1217.	0.0000E+00	0.0000E+00	0.0000E+00	-2733.	-8531.	8531.	7731.
227	-6783.	-1888.	0.0000E+00	1352.	0.0000E+00	0.0000E+00	136.8	-1406.	-7402.	7538.	6938.
228	-8228.	1526.	0.0000E+00	3333.	0.0000E+00	0.0000E+00	2618.	0.0000E+00	-9320.	0.1194E+05	0.1088E+05
229	-8250.	-1475.	0.0000E+00	3204.	0.0000E+00	0.0000E+00	711.7	-667.2	-9770.	0.1048E+05	9883.
230	-6529.	-2887.	0.0000E+00	283.9	0.0000E+00	0.0000E+00	-2293.	-7123.	7123.	6389.
231	-5705.	421.2	0.0000E+00	-1358.	0.0000E+00	0.0000E+00	713.8	0.0000E+00	-6000.	6713.	6405.
232	-4931.	-216.3	0.0000E+00	-1093.	0.0000E+00	0.0000E+00	322.8	-249.7	-5221.	5543.	5289.
233	-3165.	632.8	0.0000E+00	643.9	0.0000E+00	0.0000E+00	1342.	67.65	-3942.	5284.	4927.
234	-1128.	-1114.	0.0000E+00	-1363.	0.0000E+00	0.0000E+00	242.6	0.0000E+00	-2484.	2727.	2614.
235	-3600.	-1324.	0.0000E+00	-2338.	0.0000E+00	0.0000E+00	346.0	-549.8	-6720.	7066.	6674.
236	-0.1921E+05	1688.	0.0000E+00	-3439.	0.0000E+00	0.0000E+00	2310.	0.0000E+00	-0.1983E+05	0.2214E+05	0.2117E+05
237	-0.1931E+05	-7175.	0.0000E+00	-1979.	0.0000E+00	0.0000E+00	0.0000E+00	-6790.	-0.1970E+05	0.1970E+05	0.1798E+05
238	-0.1267E+05	-6172.	0.0000E+00	126.9	0.0000E+00	0.0000E+00	0.0000E+00	-5979.	-0.1286E+05	0.1286E+05	0.1133E+05
239	-0.1724E+05	-7531.	0.0000E+00	2292.	0.0000E+00	0.0000E+00	0.0000E+00	-6739.	-0.1804E+05	0.1804E+05	0.1669E+05
240	-0.1303E+05	1983.	0.0000E+00	4579.	0.0000E+00	0.0000E+00	3863.	0.0000E+00	-0.1493E+05	0.1880E+05	0.1785E+05
241	4839.	-1905.	0.0000E+00	2917.	0.0000E+00	0.0000E+00	6618.	0.0000E+00	-3684.	0.1030E+05	9644.
242	8713.	-1319.	0.0000E+00	-439.7	0.0000E+00	0.0000E+00	8985.	0.0000E+00	-1590.	0.1058E+05	9877.
243	1723.	-1796.	0.0000E+00	-3102.	0.0000E+00	0.0000E+00	4389.	0.0000E+00	-4462.	8851.	8469.
244	-0.1518E+05	2404.	0.0000E+00	-4333.	0.0000E+00	0.0000E+00	3692.	0.0000E+00	-0.1647E+05	0.2016E+05	0.1896E+05
245	-0.1988E+05	-0.1100E+05	0.0000E+00	-2383.	0.0000E+00	0.0000E+00	0.0000E+00	-9584.	-0.2129E+05	0.2129E+05	0.1926E+05
246	-0.1303E+05	-6443.	0.0000E+00	110.8	0.0000E+00	0.0000E+00	0.0000E+00	-6214.	-0.1326E+05	0.1326E+05	0.1165E+05
247	-0.1742E+05	-4214.	0.0000E+00	2052.	0.0000E+00	0.0000E+00	0.0000E+00	-3882.	-0.1775E+05	0.1775E+05	0.1662E+05
248	-0.1791E+05	857.0	0.0000E+00	3749.	0.0000E+00	0.0000E+00	1802.	-62.64	-0.1879E+05	0.2059E+05	0.1989E+05
249	-3074.	-1462.	0.0000E+00	2281.	0.0000E+00	0.0000E+00	579.2	-203.2	-4912.	5491.	5265.
250	-402.0	-1387.	0.0000E+00	-298.0	0.0000E+00	0.0000E+00	356.3	0.0000E+00	-2146.	2502.	2345.
251	-3478.	282.8	0.0000E+00	-1304.	0.0000E+00	0.0000E+00	978.3	-84.81	-4088.	5067.	4842.
252	-9414.	1389.	0.0000E+00	-1248.	0.0000E+00	0.0000E+00	1538.	0.0000E+00	-9364.	0.1110E+05	0.1042E+05
253	-8304.	-2880.	0.0000E+00	-664.7	0.0000E+00	0.0000E+00	0.0000E+00	-2368.	-8816.	8816.	7905.
254	3222.	-9893.	0.0000E+00	-270.6	0.0000E+00	0.0000E+00	3317.	0.0000E+00	-9988.	0.1331E+05	0.1200E+05
255	3053.	-0.1065E+05	0.0000E+00	0.7886E-09	0.0000E+00	0.0000E+00	3157.	0.0000E+00	-0.1076E+05	0.1392E+05	0.1264E+05
256	3162.	-0.1240E+05	0.0000E+00	270.6	0.0000E+00	0.0000E+00	3243.	0.0000E+00	-0.1248E+05	0.1573E+05	0.1439E+05
257	3440.	-0.1615E+05	0.0000E+00	-279.6	0.0000E+00	0.0000E+00	3508.	0.0000E+00	-0.1622E+05	0.1973E+05	0.1823E+05
258	3071.	-0.1086E+05	0.0000E+00	0.1924E-08	0.0000E+00	0.0000E+00	3179.	0.0000E+00	-0.1097E+05	0.1415E+05	0.1287E+05
259	3206.	-6423.	0.0000E+00	279.6	0.0000E+00	0.0000E+00	3341.	0.0000E+00	-6358.	9898.	8747.
260	415.7	-1221.	0.0000E+00	-781.6	0.0000E+00	0.0000E+00	730.5	0.0000E+00	-1536.	2266.	2133.

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SPACER DISK THERMAL STRESS ANALYSIS, ACCIDENT CONDITIONS                    10.7946  MAY  1,1990 CP=    268.420

        ***** POST1 NODAL STRESS LISTING *****

 LOAD STEP     1  ITERATION=     1  SECTION=  1
 TIME=   0.00000E+00      LOAD CASE=  1

 THE FOLLOWING X,Y,Z STRESSES ARE IN GLOBAL COORDINATES

  NODE     SX          SY          SZ          SXY         SYZ         SXZ         SIG1        SIG2        SIG3         SI          SIGE
   261  -326.1       -9038.      0.0000E+00   131.0      0.0000E+00  0.0000E+00  0.0000E+00  -264.2      -9100.       9100.       8971.
   262  -303.4      -0.1146E+05  0.0000E+00  0.4310E-09  0.0000E+00  0.0000E+00  0.0000E+00  -259.5     -0.1151E+05  0.1151E+05  0.1138E+05
   263  -349.1      -0.1164E+05  0.0000E+00   -131.0     0.0000E+00  0.0000E+00  0.0000E+00  -301.9     -0.1169E+05  0.1169E+05  0.1154E+05
   264  -357.0      -0.1528E+05  0.0000E+00   134.7      0.0000E+00  0.0000E+00  0.0000E+00  -320.3     -0.1532E+05  0.1532E+05  0.1516E+05
   265  -291.4      -0.1163E+05  0.0000E+00  0.1130E-08  0.0000E+00  0.0000E+00  0.0000E+00  -246.5     -0.1168E+05  0.1168E+05  0.1156E+05
   266  -382.3       -5749.      0.0000E+00   -134.7     0.0000E+00  0.0000E+00  0.0000E+00  -273.1      -5839.       5839.       5727.
   267  -382.4        99.25      0.0000E+00   -317.4     0.0000E+00  0.0000E+00   328.2      -331.64     -377.7       906.8       858.9
   268  -176.2      -0.1020E+05  0.0000E+00   -546.2     0.0000E+00  0.0000E+00  0.0000E+00  -148.5     -0.1023E+05  0.1023E+05  0.1015E+05
   269  -169.5      -0.1035E+05  0.0000E+00  0.1576E-09  0.0000E+00  0.0000E+00  0.0000E+00  -140.3     -0.1038E+05  0.1038E+05  0.1031E+05
   270  -132.6      -0.1271E+05  0.0000E+00   546.2      0.0000E+00  0.0000E+00  0.0000E+00  -128.9     -0.1273E+05  0.1273E+05  0.1267E+05
   271  -192.3      -0.1631E+05  0.0000E+00   -536.3     0.0000E+00  0.0000E+00  0.0000E+00  -173.3     -0.1633E+05  0.1633E+05  0.1644E+05
   272  -177.4      -0.1052E+05  0.0000E+00  -0.3042E-10  0.0000E+00  0.0000E+00  0.0000E+00  -147.6     -0.1055E+05  0.1055E+05  0.1048E+05
   273  -126.9       -6748.      0.0000E+00   556.3      0.0000E+00  0.0000E+00  0.0000E+00  -80.49       -6794.       6794.       6755.
   274  -303.7        482.7      0.0000E+00   -178.5     0.0000E+00  0.0000E+00   521.3      0.0000E+00  -342.9        863.5       753.2

 MINIMUMS
 NODE        203         188           1          206          1           1          63          243         203          274         274
 VALUE  -0.2008E+05 -0.1892E+05  0.0000E+00     -4432.      0.0000E+00  0.0000E+00  0.0000E+00  -9394.     -0.2223E+05   863.5       753.2

 MAXIMUMS
 NODE          1           28            1            9          1           1           1          32           1            1           1
 VALUE  0.2868E+05  0.2056E+05  0.0000E+00     9742.      0.0000E+00  0.0000E+00  0.2869E+05  2872.      0.0000E+00  0.2869E+05  0.2869E+05

 PRINT NODAL DISPLACEMENTS
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SPACER DISK THERMAL STRESS ANALYSIS, ACCIDENT CONDITIONS                    10.7948  MAY  1,1990 CP=     268.970

        ***** POST1 NODAL DISPLACEMENT LISTING *****

 LOAD STEP     1  ITERATION=     1  SECTION=  1
 TIME=   0.00000E+00      LOAD CASE=  1

 THE FOLLOWING X,Y,Z DISPLACEMENTS ARE IN GLOBAL COORDINATES

   NODE       UX              UY
     1   0.00000000E+00 -0.78123608E-01
     2   0.44221552E-02 -0.77689329E-01
     3   0.87014627E-02 -0.76309752E-01
     4   0.12792140E-01 -0.74766740E-01
     5   0.16632128E-01 -0.72616151E-01
     6   0.20252671E-01 -0.70292768E-01
     7   0.23786847E-01 -0.68031577E-01
     8   0.27455423E-01 -0.66808723E-01
     9   0.31740545E-01 -0.65952564E-01
    10   0.35721677E-01 -0.64417054E-01
    11   0.39242092E-01 -0.62344971E-01
    12   0.42534978E-01 -0.60319307E-01
    13   0.45712145E-01 -0.58353085E-01
    14   0.48738878E-01 -0.56062379E-01
    15   0.51660709E-01 -0.53668857E-01
    16   0.54501139E-01 -0.51164555E-01
    17   0.57247003E-01 -0.48346082E-01
    18   0.59923689E-01 -0.45832867E-01
    19   0.62531526E-01 -0.43034027E-01
    20   0.65059806E-01 -0.40132681E-01
    21   0.67464849E-01 -0.37122080E-01
    22   0.69736785E-01 -0.33993287E-01
    23   0.71864604E-01 -0.30736330E-01
    24   0.73824089E-01 -0.27337819E-01
    25   0.75612624E-01 -0.23798644E-01
    26   0.77214192E-01 -0.20091724E-01
    27   0.78519159E-01 -0.16144099E-01
    28   0.79363362E-01 -0.12053420E-01
    29   0.79843075E-01 -0.79871201E-02
    30   0.80040939E-01 -0.39491311E-02
    31   0.80093800E-01  0.00000000E+00
    32   0.00000000E+00 -0.76512843E-01
    33   0.40085317E-02 -0.76113189E-01
    34   0.80566826E-02 -0.74966824E-01
    35   0.11890834E-01 -0.73260019E-01
    36   0.15582574E-01 -0.71176607E-01
    37   0.19180747E-01 -0.68860337E-01
    38   0.22826630E-01 -0.66673903E-01
    40   0.31449304E-01 -0.64354185E-01
    41   0.35065921E-01 -0.62941953E-01
    42   0.38456270E-01 -0.61130047E-01
    43   0.41678602E-01 -0.59149820E-01
```

SPACER DISK THERMAL STRESS ANALYSIS, ACCIDENT CONDITIONS 10.7949 MAY 1,1990 CP= 269.240

***** POST1 NODAL DISPLACEMENT LISTING *****

LOAD STEP 1 ITERATION= 1 SECTION= 1
TIME= 0.00000E+00 LOAD CASE= 1

THE FOLLOWING X,Y,Z DISPLACEMENTS ARE IN GLOBAL COORDINATES

NODE	UX	UY
44	0.44764918E-01	-0.57024639E-01
45	0.47728777E-01	-0.54774622E-01
46	0.50604225E-01	-0.52414439E-01
47	0.53397579E-01	-0.49950615E-01
48	0.56098767E-01	-0.47363769E-01
49	0.58743005E-01	-0.44682745E-01
50	0.61328153E-01	-0.41893454E-01
51	0.63807751E-01	-0.39045577E-01
52	0.66170815E-01	-0.36090489E-01
53	0.68393356E-01	-0.33023756E-01
54	0.70473875E-01	-0.29842223E-01
55	0.72385499E-01	-0.26527287E-01
56	0.74135837E-01	-0.23071558E-01
57	0.75692012E-01	-0.19473154E-01
58	0.76933169E-01	-0.15731821E-01
59	0.77770316E-01	-0.11786396E-01
60	0.78219738E-01	-0.78213346E-02
61	0.78394775E-01	-0.39048102E-02
62	0.78431629E-01	0.00000000E+00
63	0.00000000E+00	-0.72221693E-01
64	0.15375668E-02	-0.72200357E-01
65	0.31424249E-02	-0.71450731E-01
66	0.89657495E-02	-0.70333467E-01
67	0.12935665E-01	-0.68895101E-01
68	0.17130858E-01	-0.67340707E-01
69	0.21635191E-01	-0.65889816E-01
70	0.26740144E-01	-0.65226246E-01
71	0.00000000E+00	-0.68472853E-01
72	0.16738831E-02	-0.68506192E-01
73	0.28126388E-01	-0.61628010E-01
74	0.31166646E-01	-0.62178623E-01
76	0.00000000E+00	-0.64752573E-01
77	0.16904892E-02	-0.64745292E-01
78	0.28473469E-01	-0.58333247E-01
79	0.31612605E-01	-0.58460683E-01
80	0.35405538E-01	-0.58379586E-01
81	0.39150549E-01	-0.[illegible]4463107E-01
82	0.00000000E+00	-0.60898440E-01
83	0.17304952E-02	-0.60908717E-01
84	0.28418067E-01	-0.54829721E-01
85	0.31665650E-01	-0.54779458E-01
86	0.35571091E-01	-0.54777456E-01

SPACER DISK THERMAL STRESS ANALYSIS, ACCIDENT CONDITIONS 10.7949 MAY 1,1990 CP= 269.460

***** POST1 NODAL DISPLACEMENT LISTING *****

LOAD STEP 1 ITERATION= 1 SECTION= 1
TIME= 0.00000E+00 LOAD CASE= 1

THE FOLLOWING X,Y,Z DISPLACEMENTS ARE IN GLOBAL COORDINATES

NODE	UX	UY
87	0.39395635E-01	-0.54720611E-01
88	0.43170699E-01	-0.54577706E-01
89	0.00000000E+00	-0.56974210E-01
90	0.17607238E-02	-0.56987474E-01
91	0.28256455E-01	-0.51142575E-01
92	0.31541546E-01	-0.51018518E-01
93	0.35571225E-01	-0.50923610E-01
94	0.39496632E-01	-0.50850645E-01
95	0.43366032E-01	-0.50772537E-01
96	0.47199326E-01	-0.50695560E-01
97	0.50949440E-01	-0.50579379E-01
98	0.00000000E+00	-0.53006381E-01
99	0.17768244E-02	-0.52981174E-01
100	0.27994316E-01	-0.47357664E-01
101	0.31365677E-01	-0.47161424E-01
102	0.35473795E-01	-0.46951920E-01
103	0.39509053E-01	-0.46853035E-01
104	0.43485806E-01	-0.46834484E-01
105	0.47424150E-01	-0.46834793E-01
106	0.51310266E-01	-0.46827613E-01
107	0.55070329E-01	-0.46791936E-01
108	0.00000000E+00	-0.48940167E-01
109	0.17916862E-02	-0.49003377E-01
110	0.63392594E-02	-0.48811582E-01
111	0.10838027E-01	-0.48009244E-01
112	0.15234034E-01	-0.46896114E-01
113	0.19533169E-01	-0.45639500E-01
114	0.23700053E-01	-0.44482228E-01
115	0.27701297E-01	-0.43564309E-01
116	0.31099638E-01	-0.43146778E-01
117	0.35331529E-01	-0.42801075E-01
118	0.39458037E-01	-0.42680265E-01
119	0.43557142E-01	-0.42733029E-01
120	0.47603069E-01	-0.42827908E-01
121	0.51605345E-01	-0.42899305E-01
122	0.55534516E-01	-0.42954972E-01
123	0.00000000E+00	-0.47361741E-01
124	0.17834472E-02	-0.47390511E-01
125	0.61598633E-02	-0.47124679E-01
126	0.10458676E-01	-0.46335124E-01
127	0.14781146E-01	-0.45219589E-01
128	0.19080755E-01	-0.43977544E-01

SPACER DISK THERMAL STRESS ANALYSIS, ACCIDENT CONDITIONS 10.7950 MAY 1,1990 CP= 269.740

***** POST1 NODAL DISPLACEMENT LISTING *****

LOAD STEP 1 ITERATION= 1 SECTION= 1
TIME= 0.00000E+00 LOAD CASE= 1

THE FOLLOWING X,Y,Z DISPLACEMENTS ARE IN GLOBAL COORDINATES

NODE	UX	UY
129	0.23284498E-01	-0.42832422E-01
130	0.27522584E-01	-0.42019420E-01
131	0.29233670E-01	-0.41817363E-01
132	0.00000000E+00	-0.43709058E-01
133	0.18341751E-02	-0.43660302E-01
134	0.59269322E-02	-0.43306700E-01
135	0.10103991E-01	-0.44343686E-01
136	0.14330044E-01	-0.43432305E-01
137	0.18609926E-01	-0.42207586E-01
138	0.22941787E-01	-0.41078254E-01
139	0.27269368E-01	-0.40353502E-01
140	0.29083480E-01	-0.40269966E-01
141	0.30834401E-01	-0.40031812E-01
142	0.33146316E-01	-0.39491394E-01
143	0.39447164E-01	-0.39431406E-01
144	0.43623004E-01	-0.39320634E-01
145	0.47730134E-01	-0.39680190E-01
146	0.51736932E-01	-0.39853504E-01
147	0.53833534E-01	-0.39941797E-01
148	0.57440231E-01	-0.40037330E-01
149	0.61253239E-01	-0.40252004E-01
150	0.00000000E+00	-0.41233324E-01
151	0.19681274E-02	-0.41277791E-01
152	0.27184049E-01	-0.36023241E-01
153	0.29090393E-01	-0.36114429E-01
154	0.30971093E-01	-0.36296904E-01
155	0.56463625E-01	-0.35739899E-01
156	0.58077964E-01	-0.36018214E-01
157	0.61941035E-01	-0.36423217E-01
158	0.00000000E+00	-0.36836722E-01
159	0.19663325E-02	-0.36822786E-01
160	0.27718983E-01	-0.31742584E-01
161	0.29613083E-01	-0.32016836E-01
162	0.31528208E-01	-0.32277387E-01
163	0.57125666E-01	-0.31877539E-01
164	0.58711430E-01	-0.32080434E-01
165	0.62392151E-01	-0.32533757E-01
166	0.66307392E-01	-0.32875070E-01
167	0.00000000E+00	-0.32341982E-01
168	0.19879946E-02	-0.32339939E-01
169	0.28431068E-01	-0.27518127E-01
170	0.30378246E-01	-0.27836545E-01

SPACER DISK THERMAL STRESS ANALYSIS, ACCIDENT CONDITIONS 10.7951 MAY 1,1990 CP= 269.960

***** POST1 NODAL DISPLACEMENT LISTING *****

LOAD STEP 1 ITERATION= 1 SECTION= 1
TIME= 0.00000E+00 LOAD CASE= 1

THE FOLLOWING X,Y,Z DISPLACEMENTS ARE IN GLOBAL COORDINATES

NODE	UX	UY
171	0.32276060E-01	-0.28129724E-01
172	0.57589964E-01	-0.28006123E-01
173	0.59253143E-01	-0.28198376E-01
174	0.63214237E-01	-0.28637086E-01
175	0.66996089E-01	-0.29011419E-01
176	0.00000000E+00	-0.27800801E-01
177	0.19926009E-02	-0.27833113E-01
178	0.29174224E-01	-0.23373918E-01
179	0.31101770E-01	-0.23582339E-01
180	0.33029121E-01	-0.23891322E-01
181	0.58085814E-01	-0.24131133E-01
182	0.59718289E-01	-0.24291675E-01
183	0.63765310E-01	-0.24746695E-01
184	0.67631456E-01	-0.25114098E-01
185	0.71307673E-01	-0.25420254E-01
186	0.00000000E+00	-0.23321307E-01
187	0.20338561E-02	-0.23259302E-01
188	0.29595450E-01	-0.19219942E-01
189	0.31622473E-01	-0.19427829E-01
190	0.33573445E-01	-0.19637015E-01
191	0.58488037E-01	-0.20149069E-01
192	0.60213791E-01	-0.20414243E-01
193	0.64292679E-01	-0.20799144E-01
194	0.68193973E-01	-0.21176325E-01
195	0.71959199E-01	-0.21494333E-01
196	0.00000000E+00	-0.18669353E-01
197	0.18481377E-02	-0.18733940E-01
198	0.61517582E-02	-0.19557042E-01
199	0.11091032E-01	-0.20212361E-01
200	0.16370933E-01	-0.20016455E-01
201	0.21559141E-01	-0.18733406E-01
202	0.26225795E-01	-0.16832522E-01
203	0.30009163E-01	-0.15141273E-01
204	0.31749606E-01	-0.15019464E-01
205	0.33448516E-01	-0.15073315E-01
206	0.37144380E-01	-0.16284972E-01
207	0.41613761E-01	-0.17789431E-01
208	0.46521382E-01	-0.18639773E-01
209	0.51389616E-01	-0.18386395E-01
210	0.55721687E-01	-0.17351267E-01
211	0.59223224E-01	-0.16334154E-01
212	0.60791533E-01	-0.16352034E-01

SPACER DISK THERMAL STRESS ANALYSIS, ACCIDENT CONDITIONS 10.7951 MAY 1,1990 CP= 270.180

***** POST1 NODAL DISPLACEMENT LISTING *****

LOAD STEP 1 ITERATION= 1 SECTION= 1
TIME= 0.00000E+00 LOAD CASE= 1

THE FOLLOWING X,Y,Z DISPLACEMENTS ARE IN GLOBAL COORDINATES

NODE	UX	UY
213	0.64711732E-01	-0.16706027E-01
214	0.68647045E-01	-0.17168855E-01
215	0.72506434E-01	-0.17537500E-01
216	0.00000000E+00	-0.15616679E-01
217	0.47472155E-02	-0.15980488E-01
218	0.93031005E-02	-0.16894117E-01
219	0.14028739E-01	-0.17204876E-01
220	0.17820008E-01	-0.16606588E-01
221	0.22501614E-01	-0.14878906E-01
222	0.26946517E-01	-0.12829465E-01
223	0.31645663E-01	-0.12062903E-01
224	0.36223761E-01	-0.12612646E-01
225	0.40522262E-01	-0.14265365E-01
226	0.44967315E-01	-0.15617448E-01
227	0.48490359E-01	-0.15891323E-01
228	0.52744219E-01	-0.15224251E-01
229	0.56708395E-01	-0.14062947E-01
230	0.60880591E-01	-0.13706123E-01
231	0.64923082E-01	-0.14042290E-01
232	0.68869668E-01	-0.14619320E-01
233	0.72734849E-01	-0.15028701E-01
234	0.00000000E+00	-0.12481124E-01
235	0.50223009E-02	-0.12825971E-01
236	0.96910494E-02	-0.13625769E-01
237	0.13671363E-01	-0.14065950E-01
238	0.13494937E-01	-0.13876017E-01
239	0.17312559E-01	-0.13511760E-01
240	0.21330058E-01	-0.11688638E-01
241	0.26246223E-01	-0.98040253E-02
242	0.31344844E-01	-0.90601107E-02
243	0.36766083E-01	-0.96170555E-02
244	0.41460912E-01	-0.11155439E-01
245	0.45278141E-01	-0.12687288E-01
246	0.46994072E-01	-0.12934774E-01
247	0.48655634E-01	-0.13002798E-01
248	0.52179141E-01	-0.12287513E-01
249	0.56402215E-01	-0.11320681E-01
250	0.60855495E-01	-0.10983172E-01
251	0.65209255E-01	-0.11345607E-01
252	0.69185775E-01	-0.11964820E-01
253	0.72859917E-01	-0.12468139E-01
254	0.12817039E-01	-0.94094224E-02

```
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SPACER DISK THERMAL STRESS ANALYSIS, ACCIDENT CONDITIONS                    10.7932  MAY  1,1990 CP=     270.450

        ***** POST1 NODAL DISPLACEMENT LISTING *****

 LOAD STEP     1  ITERATION=     1  SECTION=  1
 TIME=   0.00000E+00       LOAD CASE=  1

 THE FOLLOWING X,Y,Z DISPLACEMENTS ARE IN GLOBAL COORDINATES

   NODE       UX              UY
    255   0.14921968E-01 -0.91378859E-02
    256   0.17012886E-01 -0.90436465E-02
    257   0.45320257E-01 -0.84978441E-02
    258   0.47334166E-01 -0.85154911E-02
    259   0.49267996E-01 -0.87161926E-02
    260   0.72598838E-01 -0.83830927E-02
    261   0.12523827E-01 -0.46745831E-02
    262   0.14578354E-01 -0.46245706E-02
    263   0.16622403E-01 -0.44919821E-02
    264   0.45571518E-01 -0.42234758E-02
    265   0.47533988E-01 -0.43188588E-02
    266   0.49429941E-01 -0.43318677E-02
    267   0.72516857E-01 -0.42102518E-02
    268   0.12404957E-01  0.00000000E+00
    269   0.14464628E-01  0.00000000E+00
    270   0.16512221E-01  0.00000000E+00
    271   0.45631475E-01  0.00000000E+00
    272   0.47604928E-01  0.00000000E+00
    273   0.49503083E-01  0.00000000E+00
    274   0.72472727E-01  0.00000000E+00

 MAXIMUMS
 NODE          31               1
 VALUE    0.80093800E-01 -0.78123608E-01

 /SHOW SWITCH PLOTS TO FILE PLOTS              - VECTOR MODE

 PRODUCE STRESS PLOT,   LABEL= TEMP   FAVG= 0

 CUMULATIVE DISPLAY NUMBER   1 WRITTEN TO FILE PLOTS             - VECTOR MODE
 DISPLAY TITLE= SPACER DISK THERMAL STRESS ANALYSIS, ACCIDENT CONDITIONS

 PRODUCE STRESS PLOT,   LABEL= SI     FAVG= 0

 CUMULATIVE DISPLAY NUMBER   2 WRITTEN TO FILE PLOTS             - VECTOR MODE
 DISPLAY TITLE= SPACER DISK THERMAL STRESS ANALYSIS, ACCIDENT CONDITIONS


 ***** ROUTINE COMPLETED *****  CP =       279.520

 /EOF ENCOUNTERED ON FILE18


 PREP7 AFWRITE OR SFWRITE WARNING MESSAGES =   1
 NUMBER OF SOLUTION PHASE WARNING MESSAGES =   0


 ***** RUN COMPLETED *****  CP=      279.9000   TIME=   10.7978
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
/PREP7
/TITLE,IF300 2" SPACER DISK 90 DEG. SIDE DROP ANALYSIS
ET,1,63
ET,2,21,,,4
ET,3,12,,,1
EALL,0
DENS,1,0.00073
NUXY,1,0.29
EX,1,26.2E6
C*** REAL CONSTANTS
R,1,2.0
R,2,0.01771
R,3,0.03342
C*** NODE GENERATION
CSYS,1
N,1,18.633,-90
N,31,18.655,0
FILL
NGEN,2,31,1,31,1,-0.49
NDELE,39
CSYS,0
N,63,0,-17
N,64,0.4,-17
N,70,6.4,-17
FILL
N,71,0,-16
N,72,.4,-16
N,73,6.4,-16
N,74,7.2,-16
NGEN,2,3,71,74,1,,1.0
N,80,8.2,-15
N,81,9.2,-15
NGEN,2,6,76,81,1,,1.0
N,88,10.2,-14
NGEN,2,7,82,88,1,,1.0
N,96,11.2,-13
N,97,12.2,-13
NGEN,2,9,89,97,1,,1.0
N,107,13.2,-12
N,108,0,-11
N,109,.4,-11
N,115,6.4,-11
FILL
N,116,7.2,-11
N,122,13.2,-11
FILL
NGEN,2,15,108,115,1,,.375
N,131,6.8,-10.625
NGEN,2,9,123,131,1,,.375
N,141,7.2,-10.25
N,147,13.2,-10.25
FILL
N,148,13.6,-10.25
N,149,14.6,-10.25
N,150,0,-9.25
N,151,.4,-9.25
N,152,6.4,-9.25
N,153,6.8,-9.25
N,154,7.2,-9.25
N,155,13.2,-9.25
```

********** ANSYS INPUT DATA LISTING (FILE1S) **********

```
  61  N,156,13.6,-9.25
  62  N,157,14.6,-9.25
  63  NGEN,2,8,150,157,1,,1.0
  64  N,166,15.6,-8.25
  65  NGEN,2,9,158,166,1,,1.0
  66  NGEN,2,9,167,175,1,,1.0
  67  N,183,16.6,-6.25
  68  NGEN,2,10,176,185,1,,1.0
  69  NGEN,2,64,132,148,1,,6.0
  70  N,215,16.6,-4.25
  71  FILL,212,215
  72  N,216,0,-3.625
  73  N,219,3,-3.625
  74  FILL
  75  N,220,3.8,-3.625
  76  N,226,9.8,-3.625
  77  FILL
  78  N,227,10.6,-3.625
  79  N,233,16.6,-3.625
  80  FILL
  81  NGEN,2,18,216,219,1,,0.625
  82  N,238,3.4,-3.0
  83  N,239,3.8,-3.0
  84  N,245,9.8,-3.0
  85  FILL
  86  N,246,10.2,-3.0
  87  N,247,10.6,-3.0
  88  N,253,16.6,-3.0
  89  FILL
  90  NGEN,2,17,237,239,1,,1.0
  91  NGEN,2,12,245,247,1,,1.0
  92  N,260,16.6,-2
  93  NGEN,3,7,254,260,1,,1.0
  94  C*** ELEMENT CONNECTION
  95  E,1,2,33,32
  96  EGEN,6,1,-1
  97  E,7,8,70,38
  98  E,8,9,40,70
  99  E,9,10,41,40
 100  EGEN,22,1,-1
 101  E,32,64,63
 102  E,32,33,64
 103  E,33,34,65,64
 104  EGEN,5,1,-1
 105  E,38,70,69
 106  E,63,64,72,71
 107  E,70,40,74,73
 108  E,40,41,74
 109  E,71,72,77,76
 110  E,73,74,79,78
 111  E,74,41,80,79
 112  E,41,42,81,80
 113  E,42,43,81
 114  E,76,77,83,82
 115  E,78,79,85,84
 116  E,79,80,86,85
 117  E,80,81,87,86
 118  E,81,43,44
 119  E,81,44,88
 120  E,81,88,87
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
121   E,82,83,90,89
122   E,84,83,92,91
123   EGEN,4,1,-1
124   E,88,45,96,95
125   E,44,45,88
126   E,45,46,96
127   E,46,97,96
128   E,46,47,97
129   E,89,90,99,98
130   E,91,92,101,100
131   EGEN,6,1,-1
132   E,97,47,106
133   E,47,107,106
134   E,47,48,107
135   E,98,99,109,108
136   E,100,101,116,115
137   EGEN,7,1,-1
138   E,48,49,107
139   E,107,49,122
140   E,49,50,122
141   E,108,109,124,123
142   EGEN,7,1,-1
143   E,115,131,130
144   E,115,116,131
145   E,123,124,133,132
146   EGEN,7,1,-1
147   E,130,131,140,139
148   E,131,116,141
149   E,131,141,140
150   E,116,117,142,141
151   EGEN,6,1,-1
152   E,122,148,147
153   E,122,50,148
154   E,148,50,149
155   E,50,51,149
156   E,132,133,151,150
157   E,139,140,153,152
158   E,140,141,154,153
159   E,147,148,156,155
160   E,148,149,157,156
161   E,149,51,157
162   E,51,52,157
163   E,150,151,159,158
164   E,152,133,161,160
165   E,153,154,162,161
166   E,155,156,164,163
167   E,156,157,165,164
168   E,157,52,166,165
169   E,52,53,166
170   E,158,159,168,167
171   E,160,161,170,169
172   E,161,162,171,170
173   E,163,164,173,172
174   E,164,165,174,173
175   E,165,166,175,174
176   E,166,53,54,175
177   E,167,168,177,176
178   E,169,170,179,178
179   E,170,171,180,179
180   E,172,173,182,181
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
181   EGEN,3,1,-1
182   E,173,54,185,184
183   E,54,55,185
184   E,176,177,187,186
185   E,178,179,189,188
186   E,179,180,190,189
187   E,181,182,192,191
188   EGEN,4,1,-1
189   E,55,56,185
190   E,183,56,193
191   E,186,187,197,196
192   E,188,189,204,203
193   E,189,190,205,204
194   E,191,192,212,211
195   EGEN,4,1,-1
196   E,193,56,57
197   E,195,57,215
198   E,213,57,58
199   E,196,197,216
200   E,197,198,217,216
201   EGEN,3,1,-1
202   E,200,220,219
203   E,200,201,221,220
204   EGEN,3,1,-1
205   E,203,204,223
206   E,204,205,223
207   E,205,206,224,223
208   EGEN,3,1,-1
209   E,208,227,226
210   E,208,209,228,227
211   EGEN,3,1,-1
212   E,211,212,230
213   E,212,213,231,230
214   EGEN,3,1,-1
215   E,213,58,233
216   E,216,217,235,234
217   EGEN,3,1,-1
218   E,219,238,237
219   E,219,220,238
220   E,220,239,238
221   E,220,221,240,239
222   EGEN,6,1,-1
223   E,226,246,245
224   E,226,227,246
225   E,227,247,246
226   E,227,228,248,247
227   EGEN,6,1,-1
228   E,233,58,59,253
229   E,237,238,255,254
230   E,238,239,256,255
231   E,245,246,258,257
232   E,246,247,259,258
233   E,253,59,60,260
234   E,254,253,262,261
235   E,255,256,263,262
236   E,257,258,265,264
237   E,258,259,266,265
238   E,260,60,61,267
239   E,261,262,269,268
240   E,262,263,270,269
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
241   E,264,265,272,271
242   E,265,266,273,272
243   E,267,61,62,274
244   C*** SYMMETRIC GENERATION
245   SYMM,1,1000,1,500
246   SYMM,2,2000,1,2000
247   ESYM,2,1000,1,500
248   ESYM,2,2000,1,2000
249   MERGE
250   CSYS,0
251   C*** MASS ELEMENTS
252   TYPE,2
253   REAL,2
254   E,64
255   E,70
256   E,133
257   E,139
258   E,141
259   E,147
260   E,237
261   E,239
262   E,245
263   E,247
264   E,253
265   E,1064
266   E,1070
267   E,1133
268   E,1139
269   E,1141
270   E,1147
271   E,1237
272   E,1239
273   E,1245
274   E,1247
275   E,1253
276   E,3211
277   E,3207
278   E,3205
279   E,3197
280   E,3203
281   E,2197
282   E,2203
283   E,2205
284   E,2211
285   E,3115
286   E,3109
287   E,2109
288   E,2115
289   REAL,3
290   E,65
291   EGEN,5,1,-1
292   E,134
293   EGEN,5,1,-1
294   E,142
295   EGEN,5,1,-1
296   E,234
297   E,235
298   E,236
299   E,240
300   EGEN,5,1,-1
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
E,248
EGEN,3,1,-1
E,1063
EGEN,3,1,-1
E,1134
EGEN,3,1,-1
E,1142
EGEN,3,1,-1
E,1240
EGEN,3,1,-1
E,1248
EGEN,3,1,-1
E,1233
E,1234
E,2206
EGEN,3,1,-1
E,2198
EGEN,3,1,-1
E,3198
EGEN,3,1,-1
E,3206
EGEN,3,1,-1
E,2110
EGEN,3,1,-1
E,3110
EGEN,3,1,-1
WSORT,Y
C*** BOUNDARY CONDITIONS
D,1,ALL,0.0
CSYS,1
NROTATE,2,6
NROTATE,2002,2006
D,2,UX,0.0,,9,1
D,2002,UX,0.0,,2006,1
CSYS,0
D,93,UX,0.0,,93,1
D,102,UX,0.0,,104,1
D,117,UX,0.0,,119,1
D,1093,UX,0.0,,1095,1
D,1102,UX,0.0,,1104,1
D,1117,UX,0.0,,1119,1
D,2093,UX,0.0,,2095,1
D,2102,UX,0.0,,2104,1
D,2117,UX,0.0,,2119,1
D,3093,UX,0.0,,3095,1
D,3102,UX,0.0,,3104,1
D,3117,UX,0.0,,3119,1
C*** LOADING CONDITIONS
ITER,1,,1
ACEL,,1.0
AFWRITE
FINISH
/EXEC
/INPUT,27
FINISH
/EXEC
/BUCKLE,,,,,,1
ITER,1,1,1
END
FINISH
```

********** ANSYS INPUT DATA LISTING (FILE16) **********

361 /EOF

```
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IF300 2" SPACER DISK 90 DEG. SIDE DROP ANALYSIS                              12.2928  MAY 21,1990 CP=   7468.060

 ***** STATIC LOAD MULTIPLIERS FOR BUCKLING *****

   1   1585286.3
   2  -1932515.3

 INTEGER STORAGE REQUIREMENTS FOR FULL SUBSPACE ITERATION        CP=  7469.650  TIME= 12.29320
FIXED DATA =     6078   TEMPORARY DATA =    54527   TOTAL=   60605
FIXED AVAIL= 2250000   TEMPORARY AVAIL= 2250000   TOTAL AVAIL= 2250000
```

********** ANSYS INPUT DATA LISTING (FILE16) **********

```
  1  /PREP7
  2  /TITLE,IF300 2" SPACER DISK 0 DEG. SIDE DROP BUCKLING ANALYSIS
  3  ET,1,63
  4  ET,2,21,,,4
  5  KAN,0
  6  DENS,1,0.00073
  7  NUXY,1,0.29
  8  EX,1,26.2E6
  9  C*** REAL CONSTANTS
 10  R,1,2.0
 11  R,2,0.01771
 12  R,3,0.03542
 13  C*** NODE GENERATION
 14  CSYS,1
 15  N,1,18.655,-90
 16  N,31,18.655,0
 17  FILL
 18  NGEN,2,31,1,31,1,-0.49
 19  NDELE,30
 20  CSYS,0
 21  N,63,0,-17
 22  N,64,0.4,-17
 23  N,70,6.4,-17
 24  FILL
 25  N,71,0,-16
 26  N,72,.4,-16
 27  N,73,6.4,-16
 28  N,74,7.2,-16
 29  NGEN,2,5,71,74,1,,1.0
 30  N,80,8.2,-15
 31  N,81,9.2,-15
 32  NGEN,2,6,76,81,1,,1.0
 33  N,88,10.2,-14
 34  NGEN,2,7,82,88,1,,1.0
 35  N,96,11.2,-13
 36  N,97,12.2,-13
 37  NGEN,2,9,89,97,1,,1.0
 38  N,107,13.2,-12
 39  N,108,0,-11
 40  N,109,.4,-11
 41  N,115,6.4,-11
 42  FILL
 43  N,116,7.2,-11
 44  N,122,13.2,-11
 45  FILL
 46  NGEN,2,15,108,115,1,,.375
 47  N,131,6.8,-10.625
 48  NGEN,2,9,123,131,1,,.375
 49  N,141,7.2,-10.25
 50  N,147,13.2,-10.25
 51  FILL
 52  N,148,13.6,-10.25
 53  N,149,14.6,-10.25
 54  N,150,0,-9.25
 55  N,151,.4,-9.25
 56  N,152,6.4,-9.25
 57  N,153,6.8,-9.25
 58  N,154,7.2,-9.25
 59  N,155,13.2,-9.25
 60  N,156,13.6,-9.25
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
  61  N,137,14.6,-9.25
  62  NGEN,2,8,130,137,1,,1.0
  63  N,166,15.6,-8.25
  64  NGEN,2,9,158,166,1,,1.0
  65  NGEN,2,9,167,175,1,,1.0
  66  N,183,16.6,-6.25
  67  NGEN,2,10,176,183,1,,1.0
  68  NGEN,2,64,132,148,1,,6.0
  69  N,213,16.6,-4.25
  70  FILL,212,213
  71  N,216,0,-3.625
  72  N,219,3,-3.625
  73  FILL
  74  N,220,3.8,-3.625
  75  N,226,9.8,-3.625
  76  FILL
  77  N,227,10.6,-3.625
  78  N,233,16.6,-3.625
  79  FILL
  80  NGEN,2,18,216,219,1,,0.625
  81  N,238,3.4,-3.0
  82  N,239,3.8,-3.0
  83  N,245,9.8,-3.0
  84  FILL
  85  N,246,10.2,-3.0
  86  N,247,10.6,-3.0
  87  N,253,16.6,-3.0
  88  FILL
  89  NGEN,2,17,237,239,1,,1.0
  90  NGEN,2,12,245,247,1,,1.0
  91  N,260,16.6,-2
  92  NGEN,3,7,254,260,1,,1.0
  93  C*** ELEMENT GENERATION
  94  E,1,2,33,32
  95  EGEN,6,1,-1
  96  E,7,8,70,38
  97  E,8,9,40,70
  98  E,9,10,41,40
  99  EGEN,22,1,-1
 100  E,32,64,63
 101  E,32,33,64
 102  E,33,34,65,64
 103  EGEN,5,1,-1
 104  E,38,70,69
 105  E,63,64,72,71
 106  E,70,40,74,73
 107  E,40,41,74
 108  E,71,72,77,76
 109  E,73,74,79,78
 110  E,74,41,80,79
 111  E,41,42,81,80
 112  E,42,43,81
 113  E,76,77,83,82
 114  E,78,79,85,84
 115  E,79,80,86,85
 116  E,80,81,87,86
 117  E,81,43,44
 118  E,81,44,88
 119  E,81,88,87
 120  E,82,83,90,89
```

********** ANSYS INPUT DATA LISTING (FILE16) **********

```
121   E,84,85,92,91
122   EGEN,4,1,-1
123   E,88,45,96,95
124   E,44,45,88
125   E,45,46,96
126   E,46,97,96
127   E,46,47,97
128   E,89,90,99,98
129   E,91,92,101,100
130   EGEN,6,1,-1
131   E,97,47,106
132   E,47,107,106
133   E,47,48,107
134   E,98,99,109,108
135   E,100,101,116,115
136   EGEN,7,1,-1
137   E,48,49,107
138   E,107,49,122
139   E,49,50,122
140   E,108,109,124,123
141   EGEN,7,1,-1
142   E,115,131,130
143   E,115,116,131
144   E,123,124,133,132
145   EGEN,7,1,-1
146   E,130,131,140,139
147   E,131,116,141
148   E,131,141,140
149   E,116,117,142,141
150   EGEN,6,1,-1
151   E,122,148,147
152   E,122,50,148
153   E,148,50,149
154   E,50,51,149
155   E,132,133,151,150
156   E,139,140,153,152
157   E,140,141,154,153
158   E,147,148,156,155
159   E,148,149,157,156
160   E,149,51,157
161   E,51,52,157
162   E,150,151,159,158
163   E,152,153,161,160
164   E,153,154,162,161
165   E,155,156,164,163
166   E,156,157,165,164
167   E,157,52,166,165
168   E,52,53,166
169   E,158,159,168,167
170   E,160,161,170,169
171   E,161,162,171,170
172   E,163,164,173,172
173   E,164,165,174,173
174   E,165,166,173,174
175   E,166,53,54,173
176   E,167,168,177,176
177   E,169,170,179,178
178   E,170,171,180,179
179   E,172,173,182,181
180   EGEN,3,1,-1
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
E,175,54,185,184
E,54,55,185
E,176,177,187,186
E,178,179,189,188
E,179,180,190,189
E,181,182,192,191
EGEN,4,1,-1
E,55,56,185
E,185,56,195
E,186,187,197,196
E,188,189,204,203
E,189,190,205,204
E,191,192,212,211
EGEN,4,1,-1
E,193,56,57
E,195,57,215
E,215,57,58
E,196,197,216
E,197,198,217,216
EGEN,3,1,-1
E,200,220,219
E,200,201,221,220
EGEN,3,1,-1
E,203,204,223
E,204,205,223
E,205,206,224,223
EGEN,3,1,-1
E,208,227,226
E,208,209,228,227
EGEN,3,1,-1
E,211,212,230
E,212,213,231,230
EGEN,3,1,-1
E,213,58,233
E,216,217,235,234
EGEN,3,1,-1
E,219,238,237
E,219,220,238
E,220,239,238
E,220,221,240,239
EGEN,6,1,-1
E,226,246,245
E,226,227,246
E,227,247,246
E,227,228,248,247
EGEN,6,1,-1
E,233,58,59,253
E,237,238,255,254
E,238,239,256,255
E,245,246,258,257
E,246,247,259,258
E,253,59,60,260
E,254,255,262,261
E,255,256,263,262
E,257,258,265,264
E,258,259,266,265
E,260,60,61,267
E,261,262,269,268
E,262,263,270,269
E,264,265,272,271
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
241   E,265,266,273,272
242   E,267,61,62,274
243   C*** SYMMETRIC GENERATION
244   SYMM,1,1000,1,500
245   SYMM,2,2000,1,2000
246   ESYM,2,1000,1,500
247   ESYM,2,2000,1,2000
248   MERGE
249   CSYS,0
250   C*** MASS ELEMENTS
251   TYPE,2
252   REAL,2
253   E,70
254   E,139
255   E,147
256   E,237
257   E,245
258   E,253
259   E,1064
260   E,1133
261   E,1141
262   E,1239
263   E,1247
264   E,3205
265   E,3197
266   E,2203
267   E,2211
268   E,3109
269   E,2115
270   E,115
271   E,1109
272   E,203
273   E,211
274   E,1197
275   E,1205
276   E,2253
277   E,2245
278   E,2237
279   E,3239
280   E,3247
281   E,2147
282   E,2139
283   E,3133
284   E,3141
285   E,2070
286   E,3064
287   REAL,3
288   E,73
289   E,78
290   E,84
291   E,91
292   E,100
293   E,1072
294   E,1077
295   E,1083
296   E,1090
297   E,1099
298   E,155
299   E,163
300   E,172
```

********** ANSYS INPUT DATA LISTING (FILE16) **********

```
301    E,181
302    E,191
303    E,152
304    E,160
305    E,169
306    E,178
307    E,188
308    E,1151
309    E,1159
310    E,1168
311    E,1177
312    E,1187
313    E,1154
314    E,1162
315    E,1171
316    E,1180
317    E,1190
318    E,260
319    E,267
320    E,274
321    E,2267
322    E,2260
323    E,257
324    E,264
325    E,271
326    E,2264
327    E,2257
328    E,254
329    E,261
330    E,268
331    E,2261
332    E,2254
333    E,1259
334    E,1266
335    E,1273
336    E,3266
337    E,3259
338    E,1256
339    E,1263
340    E,1270
341    E,3263
342    E,3256
343    E,2191
344    E,2181
345    E,2172
346    E,2163
347    E,2155
348    E,2188
349    E,2178
350    E,2169
351    E,2160
352    E,2152
353    E,3190
354    E,3180
355    E,3171
356    E,3162
357    E,3154
358    E,3187
359    E,3177
360    E,3168
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
  361   E,3139
  362   E,3131
  363   E,2100
  364   E,2091
  365   E,2084
  366   E,2078
  367   E,2073
  368   E,3099
  369   E,3090
  370   E,3083
  371   E,3077
  372   E,3072
  373   /EOF,Y
  374   C*** BOUNDARY CONDITIONS
  375   D,31,ALL,0.0
  376   CSYS,1
  377   NROTATE,25,30
  378   NROTATE,2025,2030
  379   D,25,UX,0.0,,30,1
  380   D,2025,UX,0.0,,2030,1
  381   CSYS,0
  382   D,93,UZ,0.0,,95,1
  383   D,102,UZ,0.0,,104,1
  384   D,117,UZ,0.0,,119,1
  385   D,1093,UZ,0.0,,1095,1
  386   D,1102,UZ,0.0,,1104,1
  387   D,1117,UZ,0.0,,1119,1
  388   D,2093,UZ,0.0,,2095,1
  389   D,2102,UZ,0.0,,2104,1
  390   D,2117,UZ,0.0,,2119,1
  391   D,3093,UZ,0.0,,3095,1
  392   D,3102,UZ,0.0,,3104,1
  393   D,3117,UZ,0.0,,3119,1
  394   C*** LOADING CONDITIONS
  395   ITER,1,0,1
  396   ACEL,-1.0
  397   AFWRITE
  398   FINISH
  399   /EXEC
  400   /INPUT,27
  401   FINISH
  402   /EXEC
  403   /BUCKLE,,,,,,1
  404   ITER,1,1,1
  405   END
  406   FINISH
  407   /EOF
```

```
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IF300 2" SPACER DISK 9 DEG. SIDE DROP BUCKLING ANALYSIS                          16.4700  MAY 21,1990 CP=   2497.290

 ***** STATIC LOAD MULTIPLIERS FOR BUCKLING *****

   1   1238159.3
   2   3421776.1

 INTEGER STORAGE REQUIREMENTS FOR FULL SUBSPACE ITERATION          CP=  2498.940  TIME= 16.47050
FIXED DATA =     6068  TEMPORARY DATA =    54523   TOTAL=    60591
FIXED AVAIL= 2250000  TEMPORARY AVAIL= 2250000   TOTAL AVAIL= 2250000
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
/PREP7
/TITLE,IF300 3/4" SPACER DISK 0 DEG. 1' SIDE DROP ANALYSIS
ET,1,42,,,3
ET,2,21,,,4
ET,3,12,,,1
KAN,4
KAY,5,2
GAMMA,0.02,20
DENS,1,0.00073
NUXY,1,0.29
EX,1,26.2E6
C*** REAL CONSTANTS
R,1,0.75
R,2,0.1639
R,3,0.01092
R,4,0.01492
R,5,0.01271
R,104,8.93,1.0E11,-0.080,3.0
R,105,11.94,1.0E11,-0.075,3.0
R,106,14.92,1.0E11,-0.070,3.0
R,107,17.92,1.0E11,-0.065,3.0
R,108,20.90,1.0E11,-0.061,3.0
R,109,23.88,1.0E11,-0.056,3.0
R,110,26.87,1.0E11,-0.052,3.0
R,111,29.85,1.0E11,-0.047,3.0
R,112,32.84,1.0E11,-0.043,3.0
R,113,35.83,1.0E11,-0.039,3.0
R,114,38.82,1.0E11,-0.035,3.0
R,115,41.81,1.0E11,-0.031,3.0
R,116,44.79,1.0E11,-0.028,3.0
R,117,47.78,1.0E11,-0.024,3.0
R,118,50.77,1.0E11,-0.021,3.0
R,119,53.77,1.0E11,-0.018,3.0
R,120,56.76,1.0E11,-0.015,3.0
R,121,59.76,1.0E11,-0.013,3.0
R,122,62.74,1.0E11,-0.010,3.0
R,123,65.73,1.0E11,-0.008,3.0
R,124,68.73,1.0E11,-0.006,3.0
R,125,71.72,1.0E11,-0.005,3.0
R,126,74.71,1.0E11,-0.003,3.0
R,127,77.72,1.0E11,-0.002,3.0
R,128,80.71,1.0E11,-0.001,3.0
C*** NODE GENERATION
CSYS,1
N,1,18.655,-90
N,31,18.655,0
FILL
NGEN,2,31,1,31,1,,-0.49
NDELE,39
CSYS,0
N,63,0,-17
N,64,0.4,-17
N,70,6.4,-17
FILL
N,71,0,-16
N,72,.4,-16
N,73,6.4,-16
N,74,7.2,-16
NGEN,2,5,71,74,1,,1.0
N,60,8.2,-15
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
  61  N,81,9.2,-13
  62  NGEN,2,6,76,81,1,,1.0
  63  N,88,10.2,-14
  64  NGEN,2,7,82,88,1,,1.0
  65  N,96,11.2,-13
  66  N,97,12.2,-13
  67  NGEN,2,9,89,97,1,,1.0
  68  N,107,13.2,-12
  69  N,108,0,-11
  70  N,109,.4,-11
  71  N,115,6.4,-11
  72  FILL
  73  N,116,7.2,-11
  74  N,122,13.2,-11
  75  FILL
  76  NGEN,2,15,108,115,1,,.375
  77  N,131,6.8,-10.625
  78  NGEN,2,9,123,131,1,,.375
  79  N,141,7.2,-10.25
  80  N,147,13.2,-10.25
  81  FILL
  82  N,148,13.6,-10.25
  83  N,149,14.6,-10.25
  84  N,150,0,-9.25
  85  N,151,.4,-9.25
  86  N,152,6.4,-9.25
  87  N,153,6.8,-9.25
  88  N,154,7.2,-9.25
  89  N,155,13.2,-9.25
  90  N,156,13.6,-9.25
  91  N,157,14.6,-9.25
  92  NGEN,2,8,150,157,1,,1.0
  93  N,166,15.6,-8.25
  94  NGEN,2,9,158,166,1,,1.0
  95  NGEN,2,9,167,175,1,,1.0
  96  N,183,16.6,-6.25
  97  NGEN,2,10,174,183,1,,1.0
  98  NGEN,2,64,132,148,1,,6.0
  99  N,215,16.6,-4.25
 100  FILL,212,215
 101  N,216,0,-3.625
 102  N,219,3,-3.625
 103  FILL
 104  N,220,3.8,-3.625
 105  N,226,9.8,-3.625
 106  FILL
 107  N,227,10.6,-3.625
 108  N,233,16.6,-3.625
 109  FILL
 110  NGEN,2,18,216,219,1,,0.625
 111  N,238,3.4,-3.0
 112  N,239,3.8,-3.0
 113  N,245,9.8,-3.0
 114  FILL
 115  N,246,10.2,-3.0
 116  N,247,10.6,-3.0
 117  N,253,16.6,-3.0
 118  FILL
 119  NGEN,2,17,237,239,1,,1.0
 120  NGEN,2,12,245,247,1,,1.0
```

********** ANSYS INPUT DATA LISTING (FILE:8) **********

```
121   E,260,16,6,-2
122   EGEN,3,7,234,260,1,,1.0
123   C*** ELEMENT GENERATION
124   E,1,2,33,32
125   EGEN,6,1,-1
126   E,7,8,70,38
127   E,8,9,40,70
128   E,9,10,41,40
129   EGEN,22,1,-1
130   E,32,64,63
131   E,32,33,64
132   E,33,34,65,64
133   EGEN,5,1,-1
134   E,38,70,69
135   E,63,64,72,71
136   E,70,40,74,73
137   E,40,41,74
138   E,71,72,77,76
139   E,73,74,79,78
140   E,74,41,80,79
141   E,41,42,81,80
142   E,42,43,81
143   E,76,77,83,82
144   E,78,79,85,84
145   E,79,80,86,85
146   E,80,81,87,86
147   E,81,43,44
148   E,81,44,88
149   E,81,88,87
150   E,82,83,90,89
151   E,84,85,92,91
152   EGEN,4,1,-1
153   E,88,45,96,95
154   E,44,45,88
155   E,45,46,96
156   E,46,97,96
157   E,46,47,97
158   E,89,90,99,98
159   E,91,92,101,100
160   EGEN,6,1,-1
161   E,97,47,106
162   E,47,107,106
163   E,47,48,107
164   E,98,99,109,108
165   E,100,101,116,115
166   EGEN,7,1,-1
167   E,48,49,107
168   E,107,49,122
169   E,49,30,122
170   E,108,109,124,123
171   EGEN,7,1,-1
172   E,115,131,130
173   E,115,116,131
174   E,123,124,133,132
175   EGEN,7,1,-1
176   E,130,131,140,139
177   E,131,116,141
178   E,131,141,140
179   E,116,117,142,141
180   EGEN,6,1,-1
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
181   E,122,148,147
182   E,122,50,148
183   E,148,50,149
184   E,50,51,149
185   E,132,133,131,130
186   E,139,140,133,132
187   E,140,141,134,133
188   E,147,148,136,135
189   E,148,149,137,136
190   E,149,51,137
191   E,51,52,137
192   E,130,131,139,138
193   E,132,133,141,140
194   E,133,134,142,141
195   E,135,136,144,143
196   E,136,137,145,144
197   E,137,52,146,145
198   E,52,53,146
199   E,138,139,148,147
200   E,140,141,170,169
201   E,141,142,171,170
202   E,143,144,173,172
203   E,144,145,174,173
204   E,145,146,175,174
205   E,146,53,54,175
206   E,147,148,177,176
207   E,169,170,179,178
208   E,170,171,180,179
209   E,172,173,182,181
210   EGEN,3,1,-1
211   E,173,54,185,184
212   E,54,55,185
213   E,176,177,187,186
214   E,178,179,189,188
215   E,179,180,190,189
216   E,181,182,192,191
217   EGEN,4,1,-1
218   E,55,56,185
219   E,185,56,195
220   E,186,187,197,196
221   E,188,189,204,203
222   E,189,190,205,204
223   E,191,192,212,211
224   EGEN,4,1,-1
225   E,193,56,57
226   E,193,57,215
227   E,215,57,58
228   E,196,197,216
229   E,197,198,217,216
230   EGEN,3,1,-1
231   E,200,220,219
232   E,200,201,221,220
233   EGEN,3,1,-1
234   E,203,204,223
235   E,204,205,223
236   E,205,206,224,223
237   EGEN,3,1,-1
238   E,208,227,226
239   E,208,209,228,227
240   EGEN,3,1,-1
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
241   E,211,212,230
242   E,212,213,231,230
243   EGEN,3,1,-1
244   E,215,58,233
245   E,216,217,235,234
246   EGEN,3,1,-1
247   E,219,238,237
248   E,219,220,238
249   E,220,239,238
250   E,220,221,240,239
251   EGEN,6,1,-1
252   E,226,246,245
253   E,226,227,246
254   E,227,247,246
255   E,227,228,248,247
256   EGEN,6,1,-1
257   E,233,58,59,233
258   E,237,238,255,254
259   E,238,239,256,255
260   E,245,246,258,257
261   E,246,247,259,258
262   E,253,59,60,260
263   E,254,255,262,261
264   E,255,256,263,262
265   E,257,258,265,264
266   E,258,259,266,265
267   E,260,60,61,267
268   E,261,262,269,268
269   E,262,263,270,269
270   E,264,265,272,271
271   E,265,266,273,272
272   E,267,61,62,274
273   C*** SYMMETRIC GENERATION
274   SYMM,1,1000,1,500
275   ESYM,2,1000,1,500
276   MERGE
277   C*** BOUNDARY NODES
278   NGEN,2,2000,4,28,1
279   CSYS,0
280   C*** MASS ELEMENTS
281   TYPE,2
282   REAL,2
283   E,185
284   E,195
285   E,215
286   E,233
287   E,253
288   E,267
289   E,274
290   E,1185
291   E,1195
292   E,1215
293   E,1233
294   E,1253
295   E,1267
296   E,1274
297   REAL,3
298   E,63
299   EGEN,8,1,-1
300   E,1064
```

********** ANSYS INPUT DATA LISTING (FILE16) **********

```
     1  EGEN,7,1,-1
     2  REAL,4
     3  E,40
     4  EGEN,5,1,-1
     5  E,1040
     6  EGEN,5,1,-1
     7  REAL,5
     8  E,45
     9  EGEN,11,1,-1
    10  E,1045
    11  EGEN,11,1,-1
    12  C*** GAP ELEMENTS
    13  TYPE,3
    14  REAL,104
    15  E,2004,4
    16  REAL,105
    17  E,2005,5
    18  REAL,106
    19  E,2006,6
    20  REAL,107
    21  E,2007,7
    22  REAL,108
    23  E,2008,8
    24  REAL,109
    25  E,2009,9
    26  REAL,110
    27  E,2010,10
    28  REAL,111
    29  E,2011,11
    30  REAL,112
    31  E,2012,12
    32  REAL,113
    33  E,2013,13
    34  REAL,114
    35  E,2014,14
    36  REAL,115
    37  E,2015,15
    38  REAL,116
    39  E,2016,16
    40  REAL,117
    41  E,2017,17
    42  REAL,118
    43  E,2018,18
    44  REAL,119
    45  E,2019,19
    46  REAL,120
    47  E,2020,20
    48  REAL,121
    49  E,2021,21
    50  REAL,122
    51  E,2022,22
    52  REAL,123
    53  E,2023,23
    54  REAL,124
    55  E,2024,24
    56  REAL,125
    57  E,2025,25
    58  REAL,126
    59  E,2026,26
    60  REAL,127
```

********** ANSYS INPUT DATA LISTING (FILE16) **********

```
E,2027,27
REAL,128
E,2028,28
ESORT,Y
C*** BOUNDARY CONDITIONS
SYMBC,0,2,0
D,31,ALL,0.0
CSYS,1
NROTATE,29,30
D,29,UY,0.0
D,30,UY,0.0
CSYS,0
D,93,UZ,0.0
D,94,UZ,0.0
D,95,UZ,0.0
D,102,UZ,0.0
D,103,UZ,0.0
D,104,UZ,0.0
D,117,UZ,0.0
D,118,UZ,0.0
D,119,UZ,0.0
D,1093,UZ,0.0
D,1094,UZ,0.0
D,1095,UZ,0.0
D,1102,UZ,0.0
D,1103,UZ,0.0
D,1104,UZ,0.0
D,1117,UZ,0.0
D,1118,UZ,0.0
D,1119,UZ,0.0
D,2004,ALL,0.0,,2028,1
C*** LOADING CONDITIONS
TIME,0.23E-3
ITER,12,,1
ACEL,-81144
LWRITE
TIME,.3E-3
ITER,12,,1
ACEL,0.0
LWRITE
TIME,0.02
ITER,50,,1
LWRITE
AFWRITE
FINISH
/EXEC
/INPUT,27
FINISH
/POST26
NUMVAR,15
TIME,0,0.03
DISP,2,273,UY
DISP,3,171,UY
ESTR,4,219,40,SI
ESTR,5,178,45,SI
ESTR,6,177,45,SI
ESTR,7,176,45,SI
ESTR,8,177,30,SI
ESTR,9,177,35,SI
ESTR,10,200,45,SI
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
421   ESTL,11,201,45,SI
422   ESTL,12,201,40,SI
423   ESTL,13,130,40,SI
424   ESTL,14,100,45,SI
425   /SHOW,PLOT8,,1
426   PLVAR,2,3
427   PLVAR,5,6,7
428   PLVAR,4,8,9,10
429   PLVAR,11,12,13,14
430   EXTDIM,2,9,1
431   FINISH
432   /EOF
```

```
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 IF300 3/4" SPACER DISK 0 DEG. 1° SIDE DROP ANALYSIS                    16.4350  MAY 22,1990 CP=   3461.630


        ***** GENERAL GRAPH POSTPROCESSOR (POST26) *****

 ALL POST26 SPECIFICATIONS ARE RESET TO INITIAL DEFAULTS

 MAXIMUM NUMBER OF VARIABLES= 15

 MINIMUM TIME= 0.00000E+00   MAXIMUM TIME= 0.30000E-01

 *** NOTE ***
 REDEFINITION OF TIME RANGE ERASES ALL PREVIOUSLY STORED OR CALCULATED DATA

 VARIABLE  2 IS   273 UY

 VARIABLE  3 IS   171 UY

 VARIABLE  4  IS ELEMENT   219  ITEM  40  NAME= 219  SI

 VARIABLE  5  IS ELEMENT   178  ITEM  45  NAME= 178  SI

 VARIABLE  6  IS ELEMENT   177  ITEM  45  NAME= 177  SI

 VARIABLE  7  IS ELEMENT   176  ITEM  45  NAME= 176  SI

 VARIABLE  8  IS ELEMENT   177  ITEM  30  NAME= 177  SI

 VARIABLE  9  IS ELEMENT   177  ITEM  35  NAME= 177  SI

 VARIABLE 10  IS ELEMENT   200  ITEM  45  NAME= 200  SI

 VARIABLE 11  IS ELEMENT   201  ITEM  45  NAME= 201  SI

 VARIABLE 12  IS ELEMENT   201  ITEM  40  NAME= 201  SI

 VARIABLE 13  IS ELEMENT   130  ITEM  40  NAME= 130  SI

 VARIABLE 14  IS ELEMENT   100  ITEM  45  NAME= 100  SI

 /SHOW SWITCH PLOTS TO FILE PLOTS             - VECTOR MODE

 STORAGE COMPLETE FOR     74 DATA POINTS

         SUMMARY OF VARIABLES STORED THIS STEP AND EXTREME VALUES
 VARI TYPE  IDENTIFIERS  NAME   MINIMUM     AT TIME      MAXIMUM    AT TIME

   2 DISP   273  UY     273 UY    0.0000E+00 0.2000E-01 0.0000E+00 0.2000E-01
   3 DISP   171  UY     171 UY   -0.3882E-02 0.1670E-02 0.4213E-02 0.2840E-02
   4 ESTR   219  40     219 SI    0.1867E-04 0.2083E-04 0.1296E+05 0.6740E-02
   5 ESTR   178  45     178 SI    0.1301E-02 0.2083E-04 0.1756E+05 0.1280E-02
   6 ESTR   177  45     177 SI    0.7742E-03 0.2083E-04 0.2415E+05 0.1670E-02
   7 ESTR   176  45     176 SI    0.4391E-03 0.2083E-04 0.2073E+05 0.1670E-02
   8 ESTR   177  30     177 SI    0.7262E-03 0.2083E-04 0.3022E+05 0.1670E-02
   9 ESTR   177  35     177 SI    0.7454E-03 0.2083E-04 0.3003E+05 0.1670E-02
  10 ESTR   200  45     200 SI    0.5570E-03 0.2083E-04 0.2123E+05 0.6350E-02
  11 ESTR   201  45     201 SI    0.8661E-03 0.2083E-04 0.2766E+05 0.6350E-02
  12 ESTR   201  40     201 SI    0.1284E-02 0.2083E-04 0.2748E+05 0.6350E-02
  13 ESTR   130  40     130 SI    0.3876E-04 0.2083E-04  5471.      0.2450E-02
  14 ESTR   100  45     100 SI    0.2020E-03 0.2083E-04 0.2158E+05 0.1670E-02

 PLOT DEFINITION
 CURVE  VARIABLE   NAME
    1        2   273 UY
    2        3   171 UY

 CUMULATIVE DISPLAY NUMBER   1 WRITTEN TO FILE PLOTS             - VECTOR MODE
 DISPLAY TITLE= IF300 3/4" SPACER DISK 0 DEG. 1° SIDE DROP ANALYSIS

 PLOT DEFINITION
 CURVE  VARIABLE   NAME
    1        5   178 SI
    2        6   177 SI
    3        7   176 SI

 CUMULATIVE DISPLAY NUMBER   2 WRITTEN TO FILE PLOTS             - VECTOR MODE
 DISPLAY TITLE= IF300 3/4" SPACER DISK 0 DEG. 1° SIDE DROP ANALYSIS

 PLOT DEFINITION
 CURVE  VARIABLE   NAME
    1        4   219 SI
    2        8   177 SI
    3        9   177 SI
    4       10   200 SI

 CUMULATIVE DISPLAY NUMBER   3 WRITTEN TO FILE PLOTS             - VECTOR MODE
 DISPLAY TITLE= IF300 3/4" SPACER DISK 0 DEG. 1° SIDE DROP ANALYSIS

 PLOT DEFINITION
 CURVE  VARIABLE   NAME
    1       11   201 SI
    2       12   201 SI
    3       13   130 SI
    4       14   100 SI

 CUMULATIVE DISPLAY NUMBER   4 WRITTEN TO FILE PLOTS             - VECTOR MODE
 DISPLAY TITLE= IF300 3/4" SPACER DISK 0 DEG. 1° SIDE DROP ANALYSIS

         POST26 SUMMARY OF VARIABLE EXTREME VALUES
 VARI TYPE  IDENTIFIERS  NAME   MINIMUM     AT TIME      MAXIMUM    AT TIME

   2 DISP   273  UY     273 UY    0.0000E+00 0.2000E-01 0.0000E+00 0.2000E-01
   3 DISP   171  UY     171 UY   -0.3882E-02 0.1670E-02 0.4213E-02 0.2840E-02
```

```
  4 ESTR   219  40    219 SI     0.1867E-04 0.2083E-04 0.1296E+05 0.6740E-02
  5 ESTR   178  45    178 SI     0.1301E-02 0.2083E-04 0.1756E+05 0.1280E-02
  6 ESTR   177  45    177 SI     0.7742E-03 0.2083E-04 0.2415E+05 0.1670E-02
  7 ESTR   176  45    176 SI     0.4391E-03 0.2083E-04 0.2073E+05 0.1670E-02
  8 ESTR   177  39    177 SI     0.7262E-03 0.2083E-04 0.3022E+05 0.1670E-02
  9 ESTR   177  35    177 SI     0.7454E-03 0.2083E-04 0.3005E+05 0.1670E-02

***** ROUTINE COMPLETED *****  CP =       3577.630

/EOF ENCOUNTERED ON FILE=8

FILE7 AFWRITE OR SFWRITE WARNING MESSAGES =  1
NUMBER OF SOLUTION PHASE WARNING MESSAGES =  1

***** RUN COMPLETED *****  CP=      3578.1200   TIME=   16.4673
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
  1  /PREP7
  2  /TITLE,POISON SHEET END DROP BUCKLING ANALYSIS
  3  KAN,0
  4  ET,1,3
  5  EX,1,25.8E6
  6  NUXY,1,0.29
  7  DENS,1,0.00073
  8  C*** REAL CONSTANTS
  9  R,1,0.25,0.0013,0.25
 10  C*** NODES
 11  N,1,0,0
 12  N,2,2,0.067
 13  N,3,4,0.126
 14  N,4,6,0.173
 15  N,5,8,0.203
 16  N,6,10,0.214
 17  N,7,12,0.203
 18  N,8,14,0.173
 19  N,9,16,0.126
 20  N,10,18,0.067
 21  N,11,20.0,0                                   *** CONSERVATIVE HEIGHT
 22  FILL
 23  C*** ELEMENTS
 24  E,1,2
 25  EGEN,10,1,-1
 26  ITER,1,0,1
 27  C*** BOUNDARY CONDITIONS
 28  D,1,UY,0.0
 29  D,1,UZ,0.0
 30  D,11,UY,0.0
 31  C*** LOAD CONDITIONS
 32  ACEL,386.4
 33  AFWRITE
 34  FINISH
 35  /INPUT,27
 36  FINISH
 37  /EXEC
 38  /BUCKLE,,,,,,1
 39  ITER,1,1,1
 40  END
 41  FINISH
 42  /EOF
```

```
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 POISON SHEET END DROP BUCKLING ANALYSIS                                    9.9894  MAY 24,1990 CP=     23.230

  ***** STATIC LOAD MULTIPLIERS FOR BUCKLING *****

    1   1105.3143
    2   5131.3987

  INTEGER STORAGE REQUIREMENTS FOR FULL SUBSPACE ITERATION         CP=    23.340  TIME=  9.98942
 FIXED DATA =      666  TEMPORARY DATA =      469   TOTAL=     1135
 FIXED AVAIL= 2250000  TEMPORARY AVAIL= 2250000   TOTAL AVAIL= 2250000


 ***** EXPANDED BUCKLING MODE   1 *****      LOAD FACTOR=   1105.31

    NODE       UX              UY              ROTZ

      1    0.000000E+00    0.000000E+00    0.404752
      2   -0.264734E-01    0.790217        0.375991
      3   -0.465567E-01    1.47097         0.297972
      4   -0.580814E-01    1.96135         0.188894
      5   -0.619441E-01    2.21883         0.681873E-01
      6   -0.620476E-01    2.23762        -0.473580E-01
      7   -0.631294E-01    2.04090        -0.145792
      8   -0.686883E-01    1.67027        -0.220627
      9   -0.803209E-01    1.17523        -0.270292
     10   -0.971365E-01    0.604496       -0.296914
     11   -0.117406        0.000000E+00   -0.304916

 MAXIMUMS
 NODE         11               6               1
 VALUE   -0.117406         2.23762         0.404752

  INTEGER STORAGE REQUIREMENTS FOR BACK SUBSTITUTION               CP=    23.400  TIME=  9.98943
 FIXED DATA =      666  TEMPORARY DATA =       74   TOTAL=      740
 FIXED AVAIL= 2250000  TEMPORARY AVAIL= 2250000   TOTAL AVAIL= 2250000


  *** STORAGE REQUIREMENT SUMMARY
 MAXIMUM FIXED MEMORY USED    =      666
 MAXIMUM TEMPORARY MEMORY USED=      469
 MAXIMUM TOTAL MEMORY USED    =     1135
 MAXIMUM TEMPORARY AVAILABLE  = 2249332


   *** PROBLEM STATISTICS
  NO. OF ACTIVE DEGREES OF FREEDOM =     30
  R.M.S. WAVEFRONT SIZE =     4.8
  NUMBER OF MASTER DEGREES OF FREEDOM =     2


  *** ANSYS BINARY FILE STATISTICS
 BUFFER SIZE USED= 2048
 POST DATA WRITTEN ON FILE12
```

********** ANSYS INPUT DATA LISTING (FILE16) **********

```
/PREP7
/TITLE,IP300 2" SPACER DISK 0 DEG. DEAD WEIGHT ANALYSIS
ET,1,42,,,3
ET,2,21,,,4
ET,3,12,,,1
KAN,0
DENS,1,0.00073
NUXY,1,0.29
EX,1,26.2E6
C*** REAL CONSTANTS
R,1,2.0
R,2,0.01771
R,3,0.03541
R,104,8.93,1.0E11,-0.080,3.0
R,105,11.94,1.0E11,-0.075,3.0
R,106,14.92,1.0E11,-0.070,3.0
R,107,17.92,1.0E11,-0.065,3.0
R,108,20.90,1.0E11,-0.061,3.0
R,109,23.88,1.0E11,-0.056,3.0
R,110,26.87,1.0E11,-0.052,3.0
R,111,29.85,1.0E11,-0.047,3.0
R,112,32.84,1.0E11,-0.043,3.0
R,113,35.83,1.0E11,-0.039,3.0
R,114,38.82,1.0E11,-0.035,3.0
R,115,41.81,1.0E11,-0.031,3.0
R,116,44.79,1.0E11,-0.028,3.0
R,117,47.78,1.0E11,-0.024,3.0
R,118,50.77,1.0E11,-0.021,3.0
R,119,53.77,1.0E11,-0.018,3.0
R,120,56.76,1.0E11,-0.015,3.0
R,121,59.76,1.0E11,-0.013,3.0
R,122,62.74,1.0E11,-0.010,3.0
R,123,65.73,1.0E11,-0.008,3.0
R,124,68.73,1.0E11,-0.006,3.0
R,125,71.72,1.0E11,-0.003,3.0
R,126,74.71,1.0E11,-0.003,3.0
R,127,77.72,1.0E11,-0.002,3.0
R,128,80.71,1.0E11,-0.001,3.0
C*** NODE GENERATION
CSYS,1
N,1,18.655,-90
N,31,18.655,0
FILL
NGEN,2,31,1,31,1,,-0.49
NDELE,39
CSYS,0
N,63,0,-17
N,64,0.4,-17
N,70,6.4,-17
FILL
N,71,0,-16
N,72,.4,-16
N,73,6.4,-16
N,74,7.2,-16
NGEN,2,3,71,74,1,,1.0
N,80,8.2,-15
N,81,9.2,-15
NGEN,2,6,76,81,1,,1.0
N,88,10.2,-14
NGEN,2,7,82,88,1,,1.0
```

********** ABBTS INPUT DATA LISTING (FILE 8) **********

```
  61   N,96,11.2,-13
  62   N,97,12.2,-13
  63   NGEN,2,9,89,97,1,,1.0
  64   N,107,13.2,-12
  65   N,108,0,-11
  66   N,109,.4,-11
  67   N,115,6.4,-11
  68   FILL
  69   N,116,7.2,-11
  70   N,122,13.2,-11
  71   FILL
  72   NGEN,2,15,108,115,1,,.375
  73   N,131,6.8,-10.625
  74   NGEN,2,9,123,131,1,,.375
  75   N,141,7.2,-10.25
  76   N,147,13.2,-10.25
  77   FILL
  78   N,148,13.6,-10.25
  79   N,149,14.6,-10.25
  80   N,150,0,-9.25
  81   N,151,.4,-9.25
  82   N,152,6.4,-9.25
  83   N,153,6.8,-9.25
  84   N,154,7.2,-9.25
  85   N,155,13.2,-9.25
  86   N,156,13.6,-9.25
  87   N,157,14.6,-9.25
  88   NGEN,2,8,150,157,1,,1.0
  89   N,166,15.6,-8.25
  90   NGEN,2,9,158,166,1,,1.0
  91   NGEN,2,9,167,175,1,,1.0
  92   N,183,16.6,-6.25
  93   NGEN,2,10,176,185,1,,1.0
  94   NGEN,2,64,132,148,1,,6.0
  95   N,215,16.6,-4.25
  96   FILL,212,215
  97   N,216,0,-3.625
  98   N,219,3,-3.625
  99   FILL
 100   N,220,3.8,-3.625
 101   N,226,9.8,-3.625
 102   FILL
 103   N,227,10.6,-3.625
 104   N,233,16.6,-3.625
 105   FILL
 106   NGEN,2,18,216,219,1,,0.625
 107   N,238,3.4,-3.0
 108   N,239,3.8,-3.0
 109   N,245,9.8,-3.0
 110   FILL
 111   N,246,10.2,-3.0
 112   N,247,10.6,-3.0
 113   N,253,16.6,-3.0
 114   FILL
 115   NGEN,2,17,237,239,1,,1.0
 116   NGEN,2,12,245,247,1,,1.0
 117   N,260,16.6,-2
 118   NGEN,3,7,254,260,1,,1.0
 119   C*** ELEMENT GENERATION
 120   E,1,2,33,32
```

********** ANSYS INPUT DATA LISTING (FILE16) **********

```
121   EGEN,6,1,-1
122   E,7,8,70,38
123   E,8,9,40,70
124   E,9,10,41,40
125   EGEN,22,1,-1
126   E,32,64,63
127   E,33,33,64
128   E,33,34,65,64
129   EGEN,3,1,-1
130   E,38,70,69
131   E,63,64,72,71
132   E,70,40,74,73
133   E,40,41,74
134   E,71,72,77,76
135   E,73,74,79,78
136   E,74,41,80,79
137   E,41,42,81,80
138   E,42,43,81
139   E,76,77,83,82
140   E,78,79,85,84
141   E,79,80,86,85
142   E,80,81,87,86
143   E,81,43,44
144   E,81,44,88
145   E,81,88,87
146   E,82,83,90,89
147   E,84,85,92,91
148   EGEN,4,1,-1
149   E,88,45,96,95
150   E,44,45,88
151   E,45,46,96
152   E,46,97,96
153   E,46,47,97
154   E,89,90,99,98
155   E,91,92,101,100
156   EGEN,6,1,-1
157   E,97,47,106
158   E,47,107,106
159   E,47,48,107
160   E,98,99,109,108
161   E,100,101,116,115
162   EGEN,7,1,-1
163   E,48,49,107
164   E,107,49,122
165   E,49,50,122
166   E,108,109,124,123
167   EGEN,7,1,-1
168   E,115,131,130
169   E,115,116,131
170   E,123,124,133,132
171   EGEN,7,1,-1
172   E,130,131,140,139
173   E,131,116,141
174   E,131,141,140
175   E,116,117,142,141
176   EGEN,6,1,-1
177   E,122,148,147
178   E,122,50,148
179   E,148,50,149
180   E,50,51,149
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
181    E,132,133,131,130
182    E,139,140,133,132
183    E,140,141,134,133
184    E,147,148,136,135
185    E,148,149,137,136
186    E,149,31,137
187    E,31,32,137
188    E,130,131,139,138
189    E,132,133,141,140
190    E,133,134,142,141
191    E,135,136,144,143
192    E,136,137,145,144
193    E,137,32,146,145
194    E,32,33,146
195    E,138,139,148,147
196    E,140,141,170,169
197    E,141,142,171,170
198    E,143,144,173,172
199    E,144,145,174,173
200    E,145,146,175,174
201    E,146,33,34,175
202    E,147,148,177,176
203    E,149,170,179,178
204    E,170,171,180,179
205    E,172,173,182,181
206    EGEN,3,1,-1
207    E,173,34,183,184
208    E,34,35,183
209    E,176,177,187,186
210    E,178,179,189,188
211    E,179,180,190,189
212    E,181,182,192,191
213    EGEN,4,1,-1
214    E,33,36,183
215    E,183,36,195
216    E,186,187,197,196
217    E,188,189,204,203
218    E,189,190,205,204
219    E,191,192,212,211
220    EGEN,4,1,-1
221    E,193,36,37
222    E,195,37,215
223    E,215,37,38
224    E,196,197,216
225    E,197,198,217,216
226    EGEN,3,1,-1
227    E,200,220,219
228    E,200,201,221,220
229    EGEN,3,1,-1
230    E,203,204,223
231    E,204,205,223
232    E,205,206,224,223
233    EGEN,3,1,-1
234    E,208,227,226
235    E,208,209,228,227
236    EGEN,3,1,-1
237    E,211,212,230
238    E,212,213,231,230
239    EGEN,3,1,-1
240    E,215,38,233
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
241   E,216,217,233,234
242   EGEN,3,1,-1
243   E,219,238,237
244   E,219,220,238
245   E,220,239,238
246   E,220,221,240,239
247   EGEN,6,1,-1
248   E,226,246,245
249   E,226,227,246
250   E,227,247,246
251   E,227,228,248,247
252   EGEN,6,1,-1
253   E,233,58,59,253
254   E,237,238,253,254
255   E,238,239,256,255
256   E,245,246,258,257
257   E,246,247,259,258
258   E,253,59,60,260
259   E,254,253,262,261
260   E,255,256,263,262
261   E,257,258,265,264
262   E,258,259,266,265
263   E,260,60,61,267
264   E,261,262,269,268
265   E,262,263,270,269
266   E,264,265,272,271
267   E,265,266,273,272
268   E,267,61,62,274
269   C*** SYMMETRIC GENERATION
270   SYM,1,1000,1,500
271   ESYM,2,1000,1,500
272   MERGE
273   C*** BOUNDARY NODES
274   NGEN,2,2000,4,28,1
275   CSYS,0
276   C*** MASS ELEMENTS
277   TYPE,2
278   REAL,2
279   E,253
280   E,274
281   E,147
282   E,211
283   E,245
284   E,271
285   E,70
286   E,115
287   E,139
288   E,203
289   E,237
290   E,268
291   E,1247
292   E,1273
293   E,1239
294   E,1270
295   E,1141
296   E,1205
297   E,1064
298   E,1109
299   E,1133
300   E,1197
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
301   REAL,3
302   E,260
303   E,267
304   E,257
305   E,264
306   E,254
307   E,261
308   E,155
309   E,163
310   E,172
311   E,181
312   E,191
313   E,152
314   E,160
315   E,169
316   E,178
317   E,188
318   E,73
319   E,78
320   E,84
321   E,91
322   E,100
323   E,1072
324   E,1077
325   E,1083
326   E,1090
327   E,1099
328   E,1151
329   E,1159
330   E,1168
331   E,1177
332   E,1187
333   E,1154
334   E,1162
335   E,1171
336   E,1180
337   E,1190
338   E,1266
339   E,1259
340   E,1263
341   E,1256
342   C*** GAP ELEMENTS
343   TYPE,3
344   REAL,104
345   E,2004,4
346   REAL,105
347   E,2005,5
348   REAL,106
349   E,2006,6
350   REAL,107
351   E,2007,7
352   REAL,108
353   E,2008,8
354   REAL,109
355   E,2009,9
356   REAL,110
357   E,2010,10
358   REAL,111
359   E,2011,11
360   REAL,112
```

********** ANSYS INPUT DATA LISTING (FILE16) **********

```
361   K,2012,12
362   REAL,113
363   K,2013,13
364   REAL,114
365   K,2014,14
366   REAL,115
367   K,2015,15
368   REAL,116
369   K,2016,16
370   REAL,117
371   K,2017,17
372   REAL,118
373   K,2018,18
374   REAL,119
375   K,2019,19
376   REAL,120
377   K,2020,20
378   REAL,121
379   K,2021,21
380   REAL,122
381   K,2022,22
382   REAL,123
383   K,2023,23
384   REAL,124
385   K,2024,24
386   REAL,125
387   K,2025,25
388   REAL,126
389   K,2026,26
390   REAL,127
391   K,2027,27
392   REAL,128
393   K,2028,28
394   WSORT,Y
395   C*** BOUNDARY CONDITIONS
396   SYMM,0,2,0
397   D,31,ALL,0.0
398   CSYS,1
399   NROTATE,29,30
400   D,29,UX,0.0
401   D,30,UX,0.0
402   CSYS,0
403   D,93,UZ,0.0
404   D,94,UZ,0.0
405   D,95,UZ,0.0
406   D,102,UZ,0.0
407   D,103,UZ,0.0
408   D,104,UZ,0.0
409   D,117,UZ,0.0
410   D,118,UZ,0.0
411   D,119,UZ,0.0
412   D,1093,UZ,0.0
413   D,1094,UZ,0.0
414   D,1095,UZ,0.0
415   D,1102,UZ,0.0
416   D,1103,UZ,0.0
417   D,1104,UZ,0.0
418   D,1117,UZ,0.0
419   D,1118,UZ,0.0
420   D,1119,UZ,0.0
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
421   D,2004,ALL,0.0,,2028,1
422   C*** LOADING CONDITIONS
423   ACEL,,-386
424   ALLWRITE
425   FINISH
426   /EXEC
427   /INPUT,27
428   FINISH
429   /POST1
430   SET,1,1
431   /SHOW,PLOTS,,1
432   PLNSOL,SI
433   PLNSOL,SI
434   FINI
435   /EOF
```

IP300 2" SPACER DISK @ DEG. DEAD WEIGHT ANALYSIS 9.6882 JUN 11,1990 CP= 113.090

***** POST1 NODAL STRESS LISTING *****

LOAD STEP 1 ITERATION= 1 SECTION= 1
TIME= 0.00000E+00 LOAD CASE= 1

THE FOLLOWING X,Y,Z STRESSES ARE IN GLOBAL COORDINATES

NODE	SX	SY	SZ	SXY	SYZ	SXZ	SIG1	SIG2	SIG3	SI	SIGE
1	-33.35	0.3812	0.0000E+00	-6.124	0.0000E+00	0.0000E+00	2.772	-1.050	-34.69	37.47	35.82
2	-10.58	-4.453	0.0000E+00	-2.497	0.0000E+00	0.0000E+00	0.0000E+00	-1.955	-13.08	13.08	12.24
3	-14.16	0.8150	0.0000E+00	2.036	0.0000E+00	0.0000E+00	1.232	-0.9501E-01	-14.46	15.71	15.28
4	-22.86	-0.5327	0.0000E+00	3.321	0.0000E+00	0.0000E+00	0.2629	-0.2033	-23.45	23.71	23.48
5	-22.14	-0.3901	0.0000E+00	3.793	0.0000E+00	0.0000E+00	0.4500	-0.1823	-22.79	23.24	22.94
6	-28.01	2.255	0.0000E+00	1.621	0.0000E+00	0.0000E+00	2.367	0.0000E+00	-28.12	30.49	29.41
7	-51.60	-5.541	0.0000E+00	-1.337	0.0000E+00	0.0000E+00	0.0000E+00	-5.121	-52.02	52.02	49.73
8	-60.26	2.024	0.0000E+00	-19.48	0.0000E+00	0.0000E+00	9.317	-1.033	-66.73	76.24	71.84
9	-44.01	-10.49	0.0000E+00	-15.68	0.0000E+00	0.0000E+00	0.4292E-01	-4.322	-50.22	50.26	48.31
10	-25.85	-6.437	0.0000E+00	-7.321	0.0000E+00	0.0000E+00	0.0000E+00	-3.983	-28.30	28.30	26.53
11	-16.52	-4.612	0.0000E+00	-3.307	0.0000E+00	0.0000E+00	0.0000E+00	-3.733	-17.40	17.40	15.88
12	-9.221	-2.742	0.0000E+00	0.7586	0.0000E+00	0.0000E+00	0.1822	-2.313	-9.631	10.01	9.116
13	-2.032	0.2291E-01	0.0000E+00	5.740	0.0000E+00	0.0000E+00	5.805	-0.9687E-01	-6.917	11.92	10.94
14	5.320	4.502	0.0000E+00	11.46	0.0000E+00	0.0000E+00	16.59	0.0000E+00	-6.765	23.35	21.02
15	15.00	11.23	0.0000E+00	19.73	0.0000E+00	0.0000E+00	32.94	0.0000E+00	-6.712	39.65	36.92
16	27.48	23.61	0.0000E+00	32.99	0.0000E+00	0.0000E+00	56.22	0.0000E+00	-7.128	63.35	62.23
17	30.65	39.55	0.0000E+00	47.84	0.0000E+00	0.0000E+00	83.40	0.0000E+00	-13.20	96.60	90.78
18	37.34	63.14	0.0000E+00	55.30	0.0000E+00	0.0000E+00	107.1	0.0000E+00	-6.582	113.6	110.5
19	17.60	68.87	0.0000E+00	54.28	0.0000E+00	0.0000E+00	106.2	0.0000E+00	-19.69	125.9	117.3
20	6.196	58.68	0.0000E+00	29.57	0.0000E+00	0.0000E+00	72.01	0.0000E+00	-7.137	79.14	76.06
21	-2.963	32.91	0.0000E+00	15.18	0.0000E+00	0.0000E+00	38.54	0.0000E+00	-8.593	47.14	43.72
22	-4.660	17.44	0.0000E+00	6.881	0.0000E+00	0.0000E+00	19.41	0.0000E+00	-6.632	26.04	23.54
23	-2.432	13.78	0.0000E+00	7.027	0.0000E+00	0.0000E+00	16.51	0.0000E+00	-5.158	21.67	19.63
24	1.003	22.43	0.0000E+00	12.21	0.0000E+00	0.0000E+00	27.96	0.0000E+00	-4.524	32.49	30.61
25	0.1089	43.72	0.0000E+00	20.07	0.0000E+00	0.0000E+00	51.42	0.0000E+00	-7.791	59.41	56.06
26	6.435	73.67	0.0000E+00	21.71	0.0000E+00	0.0000E+00	80.29	0.3792	-0.3597	80.65	80.39
27	-32.68	82.18	0.0000E+00	16.65	0.0000E+00	0.0000E+00	85.84	0.0000E+00	-36.34	122.2	108.8
28	33.13	-79.17	0.0000E+00	-84.58	0.0000E+00	0.0000E+00	60.24	31.58	-157.9	238.1	218.7
29	-368.4	-331.1	0.0000E+00	-24.68	0.0000E+00	0.0000E+00	0.0000E+00	-259.8	-440.5	440.5	389.0
30	51.29	-309.7	0.0000E+00	10.39	0.0000E+00	0.0000E+00	51.83	0.0000E+00	-310.3	362.2	340.0
31	72.57	-205.8	0.0000E+00	-2.099	0.0000E+00	0.0000E+00	72.58	0.0000E+00	-205.8	278.4	250.1
32	-23.31	1.899	0.0000E+00	-12.08	0.0000E+00	0.0000E+00	13.03	-3.658	-30.78	43.81	39.07
33	-25.38	-10.21	0.0000E+00	-0.6981	0.0000E+00	0.0000E+00	0.0000E+00	-8.403	-27.18	27.18	24.96
34	-27.48	1.439	0.0000E+00	1.361	0.0000E+00	0.0000E+00	1.632	-0.9263E-01	-27.58	29.21	28.40
35	-31.19	-0.9442	0.0000E+00	2.400	0.0000E+00	0.0000E+00	0.0000E+00	-0.7480	-31.39	31.39	31.02
36	-33.73	-0.1560	0.0000E+00	1.410	0.0000E+00	0.0000E+00	0.3293	-0.4216	-33.79	34.12	33.76
37	-37.57	1.022	0.0000E+00	0.4760	0.0000E+00	0.0000E+00	1.079	-0.2734E-02	-37.63	38.70	38.19
38	-37.47	-2.353	0.0000E+00	3.016	0.0000E+00	0.0000E+00	0.2267	-2.099	-37.95	38.18	37.14
40	-19.19	-6.287	0.0000E+00	-5.071	0.0000E+00	0.0000E+00	0.4092	-3.814	-22.07	22.48	21.02
41	-16.48	-8.018	0.0000E+00	-3.275	0.0000E+00	0.0000E+00	0.0000E+00	-4.974	-19.52	19.52	17.68
42	-13.14	-5.898	0.0000E+00	-3.379	0.0000E+00	0.0000E+00	0.0000E+00	-4.019	-15.01	15.01	13.54
43	-6.731	-4.387	0.0000E+00	0.2304	0.0000E+00	0.0000E+00	0.0000E+00	-2.894	-8.224	8.224	7.315
44	-1.881	-4.149	0.0000E+00	2.463	0.0000E+00	0.0000E+00	2.416	-1.379	-7.067	9.482	8.420

IP300 2" SPACER DISK 0 DEG. DEAD WEIGHT ANALYSIS 9.6884 JUN 11,1990 CP= 113.480

***** POST1 NODAL STRESS LISTING *****

LOAD STEP 1 ITERATION= 1 SECTION= 1
TIME= 0.000000E+00 LOAD CASE= 1

THE FOLLOWING X,Y,Z STRESSES ARE IN GLOBAL COORDINATES

NODE	SX	SY	SZ	SXY	SYZ	SXZ	SIG1	SIG2	SIG3	SI	SIGE
45	3.684	-2.761	0.0000E+00	5.382	0.0000E+00	0.0000E+00	8.144	0.0000E+00	-7.202	15.35	13.72
46	9.513	0.6343	0.0000E+00	12.07	0.0000E+00	0.0000E+00	18.32	0.0000E+00	-8.172	26.49	23.65
47	16.57	-4.047	0.0000E+00	19.00	0.0000E+00	0.0000E+00	29.12	0.0000E+00	-16.60	45.71	40.67
48	17.62	12.29	0.0000E+00	31.97	0.0000E+00	0.0000E+00	49.88	0.0000E+00	-19.89	69.69	63.42
49	6.080	17.61	0.0000E+00	27.89	0.0000E+00	0.0000E+00	44.35	0.0000E+00	-20.66	65.00	59.65
50	-25.24	20.55	0.0000E+00	14.48	0.0000E+00	0.0000E+00	38.32	-5.684	-37.31	75.64	66.16
51	-17.08	39.83	0.0000E+00	11.55	0.0000E+00	0.0000E+00	42.95	0.0000E+00	-20.20	63.14	56.52
52	-16.01	24.24	0.0000E+00	0.3994	0.0000E+00	0.0000E+00	26.12	0.0000E+00	-17.89	44.01	38.77
53	-9.722	16.52	0.0000E+00	2.293	0.0000E+00	0.0000E+00	17.05	0.0000E+00	-10.23	27.29	24.02
54	-1.333	4.929	0.0000E+00	3.133	0.0000E+00	0.0000E+00	9.119	0.1279	-5.652	14.77	13.27
55	0.6640	8.877	0.0000E+00	10.52	0.0000E+00	0.0000E+00	16.77	0.0000E+00	-7.238	24.00	21.56
56	-1.343	10.48	0.0000E+00	14.03	0.0000E+00	0.0000E+00	22.26	0.0000E+00	-13.20	35.46	31.67
57	-9.895	8.057	0.0000E+00	6.942	0.0000E+00	0.0000E+00	17.41	-0.1078	-19.14	36.55	33.93
58	-49.54	-7.326	0.0000E+00	-17.93	0.0000E+00	0.0000E+00	14.63	-10.27	-61.25	75.90	68.60
59	-43.33	-33.26	0.0000E+00	-91.47	0.0000E+00	0.0000E+00	63.57	0.0000E+00	-142.2	207.7	189.4
60	-250.1	-116.6	0.0000E+00	-33.65	0.0000E+00	0.0000E+00	12.65	-89.20	-290.1	302.8	274.1
61	27.38	-184.6	0.0000E+00	16.48	0.0000E+00	0.0000E+00	30.71	-1.168	-186.8	217.5	204.4
62	62.62	-197.9	0.0000E+00	10.09	0.0000E+00	0.0000E+00	63.58	0.0000E+00	-198.9	262.4	237.3
63	-14.44	4.855	0.0000E+00	-1.335	0.0000E+00	0.0000E+00	24.20	0.0000E+00	-33.79	57.99	51.44
64	-37.17	-42.36	0.0000E+00	-0.2394	0.0000E+00	0.0000E+00	5.690	-15.36	-69.65	75.34	68.38
65	-39.19	1.998	0.0000E+00	0.2843	0.0000E+00	0.0000E+00	2.001	0.0000E+00	-39.19	61.19	60.22
66	-34.58	-1.248	0.0000E+00	0.9647	0.0000E+00	0.0000E+00	0.0000E+00	-1.231	-54.59	54.59	53.99
67	-31.02	0.4530	0.0000E+00	-0.3206	0.0000E+00	0.0000E+00	0.4532	0.0000E+00	-31.03	31.48	31.26
68	-48.00	0.2045	0.0000E+00	0.5778	0.0000E+00	0.0000E+00	0.4066	-0.1839	-48.02	48.42	48.13
69	-38.92	-0.1241	0.0000E+00	1.523	0.0000E+00	0.0000E+00	0.3932	-0.4461	-38.99	39.38	38.97
70	-23.84	9.991	0.0000E+00	-2.915	0.0000E+00	0.0000E+00	11.71	-0.7997	-24.76	36.47	32.98
71	-0.7755	6.038	0.0000E+00	20.60	0.0000E+00	0.0000E+00	24.98	0.0000E+00	-19.72	44.71	39.96
72	10.44	-64.64	0.0000E+00	20.60	0.0000E+00	0.0000E+00	18.39	0.0000E+00	-72.59	90.99	90.07
73	-3.882	25.69	0.0000E+00	0.5772	0.0000E+00	0.0000E+00	25.80	0.0000E+00	-5.990	31.79	29.29
74	-9.521	-3.643	0.0000E+00	-1.534	0.0000E+00	0.0000E+00	0.7748	-1.726	-12.21	12.99	12.02
76	-3.993	6.360	0.0000E+00	11.77	0.0000E+00	0.0000E+00	14.68	0.0000E+00	-12.31	26.99	23.39
77	-6.992	55.39	0.0000E+00	11.73	0.0000E+00	0.0000E+00	59.59	0.0000E+00	-11.19	70.78	67.79
78	-6.436	20.27	0.0000E+00	0.9330	0.0000E+00	0.0000E+00	20.35	0.0000E+00	-6.523	26.87	24.29
79	-3.221	4.097	0.0000E+00	-0.8099	0.0000E+00	0.0000E+00	4.695	0.0000E+00	-5.819	10.51	9.332
80	-4.686	-6.343	0.0000E+00	-3.275	0.0000E+00	0.0000E+00	0.0000E+00	-2.113	-8.915	8.915	8.120
81	-3.313	-8.368	0.0000E+00	-2.128	0.0000E+00	0.0000E+00	0.2910E-02	-2.244	-9.632	9.635	8.859
82	-3.231	6.523	0.0000E+00	2.948	0.0000E+00	0.0000E+00	8.601	0.0000E+00	-5.309	13.91	12.28
83	-1.990	110.7	0.0000E+00	2.970	0.0000E+00	0.0000E+00	111.0	0.0000E+00	-2.274	113.3	112.2
84	-5.580	18.96	0.0000E+00	-1.343	0.0000E+00	0.0000E+00	19.06	0.0000E+00	-5.685	24.75	22.46
85	-4.961	8.635	0.0000E+00	-2.451	0.0000E+00	0.0000E+00	9.203	0.0000E+00	-5.529	14.73	12.91
86	-2.983	-4.893	0.0000E+00	-4.013	0.0000E+00	0.0000E+00	0.9250	-0.6983	-8.103	9.028	8.394
87	-1.350	-9.893	0.0000E+00	-3.949	0.0000E+00	0.0000E+00	0.2252	0.0000E+00	-11.47	11.69	11.58
88	0.7972E-01	-9.304	0.0000E+00	-1.117	0.0000E+00	0.0000E+00	1.539	-0.6050	-10.16	11.70	11.09

IF300 2" SPACER DISK 0 DEG. DEAD WEIGHT ANALYSIS 9.6885 JUN 11,1990 CP= 113.920

***** POST1 NODAL STRESS LISTING *****

LOAD STEP 1 ITERATION= 1 SECTION= 1
TIME= 0.00000E+00 LOAD CASE= 1

THE FOLLOWING X,Y,Z STRESSES ARE IN GLOBAL COORDINATES

NODE	SX	SY	SZ	SXY	SYZ	SXZ	SIG1	SIG2	SIG3	SI	SIGE
89	-3.950	6.443	0.0000E+00	-5.876	0.0000E+00	0.0000E+00	9.640	0.0000E+00	-7.347	17.19	15.04
90	-5.189	99.45	0.0000E+00	-5.888	0.0000E+00	0.0000E+00	100.3	0.0000E+00	-5.795	106.1	103.6
91	-7.292	27.21	0.0000E+00	-3.389	0.0000E+00	0.0000E+00	27.35	0.0000E+00	-7.430	35.18	32.11
92	-6.116	9.417	0.0000E+00	-3.802	0.0000E+00	0.0000E+00	10.41	0.0000E+00	-7.113	17.53	15.29
93	-5.737	-4.774	0.0000E+00	-4.141	0.0000E+00	0.0000E+00	0.6259E-01	-1.137	-9.437	9.499	9.033
94	-6.586	-9.972	0.0000E+00	-4.173	0.0000E+00	0.0000E+00	0.0000E+00	-3.774	-12.78	12.78	11.41
95	-3.968	-11.09	0.0000E+00	-4.728	0.0000E+00	0.0000E+00	1.010	-2.217	-13.85	14.86	13.38
96	3.987	-8.626	0.0000E+00	-0.4254	0.0000E+00	0.0000E+00	6.911	-0.1716	-11.38	18.29	16.66
97	10.79	-9.103	0.0000E+00	6.389	0.0000E+00	0.0000E+00	13.58	0.0000E+00	-13.89	29.48	26.07
98	-1.190	5.913	0.0000E+00	-14.70	0.0000E+00	0.0000E+00	18.18	0.0000E+00	-13.45	31.63	28.13
99	3.096	23.42	0.0000E+00	-14.62	0.0000E+00	0.0000E+00	42.06	4.817	-20.37	62.43	59.07
100	-1.883	37.95	0.0000E+00	-1.822	0.0000E+00	0.0000E+00	38.23	0.0000E+00	-2.164	40.40	39.36
101	-7.078	7.191	0.0000E+00	-1.328	0.0000E+00	0.0000E+00	7.843	0.0000E+00	-7.730	15.57	13.82
102	-13.28	-3.739	0.0000E+00	-0.5328	0.0000E+00	0.0000E+00	0.0000E+00	-4.868	-16.15	16.15	14.39
103	-20.90	-7.293	0.0000E+00	-2.032	0.0000E+00	0.0000E+00	0.0000E+00	-6.493	-21.70	21.70	19.38
104	-23.95	-7.952	0.0000E+00	-6.574	0.0000E+00	0.0000E+00	0.0000E+00	-5.364	-26.54	26.54	24.44
105	-17.18	-9.829	0.0000E+00	-11.62	0.0000E+00	0.0000E+00	3.316	-3.932	-26.37	29.69	26.98
106	3.038	-15.63	0.0000E+00	-5.570	0.0000E+00	0.0000E+00	11.24	-1.293	-22.53	33.79	30.49
107	12.32	-14.67	0.0000E+00	20.03	0.0000E+00	0.0000E+00	31.71	0.0000E+00	-34.06	65.77	59.43
108	-11.91	7.007	0.0000E+00	-14.09	0.0000E+00	0.0000E+00	14.91	0.0000E+00	-19.81	34.72	30.21
109	-26.86	-32.33	0.0000E+00	-11.12	0.0000E+00	0.0000E+00	0.0000E+00	-15.39	-43.80	43.80	40.25
110	-48.16	6.467	0.0000E+00	0.2267	0.0000E+00	0.0000E+00	6.825	0.0000E+00	-48.52	55.34	52.27
111	-56.38	-0.5534E-01	0.0000E+00	2.318	0.0000E+00	0.0000E+00	0.6732	-0.4927	-56.61	57.29	54.71
112	-72.23	-1.054	0.0000E+00	1.168	0.0000E+00	0.0000E+00	0.0000E+00	-1.018	-72.27	72.27	71.77
113	-82.61	1.685	0.0000E+00	1.633	0.0000E+00	0.0000E+00	1.724	0.0000E+00	-82.63	84.37	83.53
114	-97.98	-4.158	0.0000E+00	1.805	0.0000E+00	0.0000E+00	0.0000E+00	-4.118	-98.02	98.02	96.03
115	-39.42	24.11	0.0000E+00	1.935	0.0000E+00	0.0000E+00	24.16	0.0000E+00	-39.48	83.64	73.58
116	-37.57	7.263	0.0000E+00	2.600	0.0000E+00	0.0000E+00	7.692	0.0000E+00	-37.99	45.69	42.52
117	-38.12	-4.640	0.0000E+00	3.957	0.0000E+00	0.0000E+00	0.0000E+00	-3.949	-38.81	38.81	37.04
118	-44.09	-3.299	0.0000E+00	0.3192	0.0000E+00	0.0000E+00	0.0000E+00	-3.154	-44.23	44.23	42.77
119	-47.87	-3.331	0.0000E+00	-4.391	0.0000E+00	0.0000E+00	0.0000E+00	-2.709	-48.51	48.51	47.24
120	-58.61	-4.747	0.0000E+00	-10.89	0.0000E+00	0.0000E+00	0.7454E-01	-2.293	-61.14	61.21	60.09
121	-31.29	-11.64	0.0000E+00	-22.35	0.0000E+00	0.0000E+00	7.338	-6.295	-63.98	71.32	65.71
122	-34.54	-38.23	0.0000E+00	1.368	0.0000E+00	0.0000E+00	11.84	-19.94	-64.68	76.52	68.57
123	-22.11	8.719	0.0000E+00	-4.393	0.0000E+00	0.0000E+00	9.975	0.0000E+00	-23.37	33.34	29.77
124	-32.52	-35.29	0.0000E+00	-1.417	0.0000E+00	0.0000E+00	0.0000E+00	-27.78	-40.04	40.04	35.94
125	-47.44	7.438	0.0000E+00	1.542	0.0000E+00	0.0000E+00	7.915	0.0000E+00	-47.92	55.83	52.36
126	-52.03	-0.3040	0.0000E+00	1.542	0.0000E+00	0.0000E+00	0.4327	-0.3861	-52.18	52.62	52.12
127	-49.09	-1.048	0.0000E+00	1.542	0.0000E+00	0.0000E+00	0.0000E+00	-0.9636	-49.18	49.18	46.71
128	-51.63	1.908	0.0000E+00	1.542	0.0000E+00	0.0000E+00	1.961	0.0000E+00	-51.68	53.64	52.70
129	-49.08	-3.043	0.0000E+00	1.542	0.0000E+00	0.0000E+00	0.0000E+00	-4.970	-49.15	49.15	46.87
130	-46.27	17.85	0.0000E+00	0.6263	0.0000E+00	0.0000E+00	17.94	0.0000E+00	-46.36	64.30	59.44
131	-43.62	16.69	0.0000E+00	-0.3932	0.0000E+00	0.0000E+00	16.78	0.0000E+00	-43.71	60.49	54.19

IF300 2" SPACER DISK 0 DEG. DEAD WEIGHT ANALYSIS 9.6886 JUN 11,1990 CP= 114.300

***** POST1 NODAL STRESS LISTING *****

LOAD STEP 1 ITERATION= 1 SECTION= 1
TIME= 0.00000E+00 LOAD CASE= 1

THE FOLLOWING X,Y,Z STRESSES ARE IN GLOBAL COORDINATES

NODE	SX	SY	SZ	SXY	SYZ	SXZ	SIG1	SIG2	SIG3	SI	SIGE
132	-11.95	6.887	0.0000E+00	10.37	0.0000E+00	0.0000E+00	13.85	0.0000E+00	-18.91	32.76	28.71
133	-36.13	-44.31	0.0000E+00	9.702	0.0000E+00	0.0000E+00	0.0000E+00	-22.46	-57.98	57.98	51.63
134	-56.05	8.410	0.0000E+00	2.857	0.0000E+00	0.0000E+00	8.768	0.0000E+00	-56.40	65.16	61.31
135	-39.78	-0.5524	0.0000E+00	0.7656	0.0000E+00	0.0000E+00	0.2648	-0.6695	-39.92	40.19	39.73
136	-30.93	-1.042	0.0000E+00	1.915	0.0000E+00	0.0000E+00	0.0000E+00	-0.9055	-31.06	31.06	30.62
137	-16.60	2.131	0.0000E+00	1.450	0.0000E+00	0.0000E+00	2.308	0.0000E+00	-16.77	19.07	18.09
138	-7.469	-3.928	0.0000E+00	1.279	0.0000E+00	0.0000E+00	0.0000E+00	-4.743	-8.655	8.655	7.546
139	-12.78	11.82	0.0000E+00	4.681	0.0000E+00	0.0000E+00	13.24	0.0000E+00	-16.20	31.45	28.13
140	-27.18	16.94	0.0000E+00	7.102	0.0000E+00	0.0000E+00	20.15	0.0000E+00	-30.39	50.54	44.33
141	-49.72	15.69	0.0000E+00	5.768	0.0000E+00	0.0000E+00	16.94	0.0000E+00	-50.97	67.91	62.65
142	-72.82	-2.885	0.0000E+00	3.565	0.0000E+00	0.0000E+00	0.0000E+00	-2.395	-73.31	73.31	72.14
143	-57.51	-1.612	0.0000E+00	0.9235	0.0000E+00	0.0000E+00	0.0000E+00	-1.339	-57.58	57.58	56.83
144	-59.01	-1.043	0.0000E+00	-2.403	0.0000E+00	0.0000E+00	0.0000E+00	-0.9104	-59.14	59.14	58.69
145	-71.79	-3.332	0.0000E+00	-6.257	0.0000E+00	0.0000E+00	0.0000E+00	-2.921	-72.40	72.40	71.00
146	-138.9	-0.8333	0.0000E+00	-25.43	0.0000E+00	0.0000E+00	4.078	0.0000E+00	-143.8	147.9	146.0
147	-131.2	-107.8	0.0000E+00	-26.20	0.0000E+00	0.0000E+00	0.0000E+00	-68.68	-170.4	170.4	150.4
148	-68.04	-49.35	0.0000E+00	-15.46	0.0000E+00	0.0000E+00	7.227	-36.41	-88.21	95.44	83.43
149	-40.41	35.18	0.0000E+00	-5.951	0.0000E+00	0.0000E+00	40.11	0.0000E+00	-43.36	83.48	75.05
150	-1.238	5.797	0.0000E+00	16.04	0.0000E+00	0.0000E+00	19.55	0.0000E+00	-14.99	34.55	30.77
151	4.768	0.5302	0.0000E+00	13.94	0.0000E+00	0.0000E+00	32.36	5.447	-32.51	64.86	61.85
152	-3.116	-48.33	0.0000E+00	13.00	0.0000E+00	0.0000E+00	9.329	-4.641	-56.34	65.87	61.48
153	2.547	16.33	0.0000E+00	12.89	0.0000E+00	0.0000E+00	24.66	2.210	-7.990	32.65	29.03
154	8.211	86.81	0.0000E+00	12.79	0.0000E+00	0.0000E+00	88.64	7.396	-3.019	91.66	86.92
155	8.986	-126.5	0.0000E+00	-20.39	0.0000E+00	0.0000E+00	12.93	0.0000E+00	-130.5	143.5	138.2
156	-6.434	-76.01	0.0000E+00	-24.98	0.0000E+00	0.0000E+00	8.673	-4.432	-86.68	95.35	89.68
157	-21.07	17.10	0.0000E+00	-13.92	0.0000E+00	0.0000E+00	25.74	0.0000E+00	-29.72	55.46	49.37
158	-3.881	6.096	0.0000E+00	7.217	0.0000E+00	0.0000E+00	10.47	0.0000E+00	-8.255	18.72	16.37
159	-3.584	86.89	0.0000E+00	7.276	0.0000E+00	0.0000E+00	87.86	0.0000E+00	-6.552	94.41	91.50
160	-3.023	-112.1	0.0000E+00	4.056	0.0000E+00	0.0000E+00	0.1050E-01	-2.603	-112.5	112.5	111.3
161	-4.675	17.00	0.0000E+00	4.069	0.0000E+00	0.0000E+00	18.55	0.0000E+00	-6.221	24.77	22.37
162	-6.326	147.2	0.0000E+00	4.082	0.0000E+00	0.0000E+00	147.4	0.0000E+00	-6.546	154.0	150.8
163	-11.22	-49.80	0.0000E+00	-3.523	0.0000E+00	0.0000E+00	0.0000E+00	-10.67	-50.35	50.35	46.05
164	-9.070	-51.05	0.0000E+00	-12.31	0.0000E+00	0.0000E+00	0.7843	-5.182	-55.72	56.51	53.98
165	-9.955	-10.50	0.0000E+00	-18.27	0.0000E+00	0.0000E+00	8.523	0.0000E+00	-28.98	37.50	34.40
166	-12.89	9.830	0.0000E+00	-9.055	0.0000E+00	0.0000E+00	15.07	-0.2435	-17.89	32.95	29.39
167	-3.121	6.567	0.0000E+00	-1.607	0.0000E+00	0.0000E+00	8.365	0.0000E+00	-4.919	13.28	11.70
168	-1.772	107.7	0.0000E+00	-1.730	0.0000E+00	0.0000E+00	107.9	0.0000E+00	-2.023	110.0	109.0
169	-4.335	-110.6	0.0000E+00	-4.626	0.0000E+00	0.0000E+00	0.0000E+00	-3.962	-111.0	111.0	109.1
170	-2.849	17.87	0.0000E+00	-4.755	0.0000E+00	0.0000E+00	19.56	0.3069	-4.847	24.40	22.35
171	-1.363	144.0	0.0000E+00	-4.884	0.0000E+00	0.0000E+00	144.4	0.6161	-2.369	146.8	145.3
172	-5.524	-26.34	0.0000E+00	-6.542	0.0000E+00	0.0000E+00	1.547	-4.326	-29.08	30.63	28.16
173	-3.417	-20.95	0.0000E+00	-12.38	0.0000E+00	0.0000E+00	4.171	-1.991	-28.54	32.72	30.33
174	-3.622	-17.39	0.0000E+00	-18.44	0.0000E+00	0.0000E+00	9.214	0.0000E+00	-30.23	39.44	35.78

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FOR SUPPORT CALL STEVE PORTER PHONE (206) 874-2235 TWX

IP300 2" SPACER DISK 0 DEG. DEAD WEIGHT ANALYSIS 9.6887 JUN 11,1990 CP= 114.690

***** POST1 NODAL STRESS LISTING *****

LOAD STEP 1 ITERATION= 1 SECTION= 1
TIME= 0.00000E+00 LOAD CASE= 1

THE FOLLOWING X,Y,Z STRESSES ARE IN GLOBAL COORDINATES

NODE	SX	SY	SZ	SXY	SYZ	SXZ	SIG1	SIG2	SIG3	SI	SIGE
175	-2.366	-9.406	0.0000E+00	-11.32	0.0000E+00	0.0000E+00	8.367	-1.323	-18.82	27.18	24.13
176	-5.193	5.933	0.0000E+00	-10.43	0.0000E+00	0.0000E+00	13.01	0.0000E+00	-12.27	25.29	22.06
177	-8.153	62.83	0.0000E+00	-10.23	0.0000E+00	0.0000E+00	65.29	0.0000E+00	-10.39	75.68	72.16
178	-2.725	-40.90	0.0000E+00	-13.84	0.0000E+00	0.0000E+00	14.27	-4.616	-52.88	67.15	62.90
179	-6.276	16.89	0.0000E+00	-13.58	0.0000E+00	0.0000E+00	24.04	0.0000E+00	-13.43	37.47	33.13
180	-9.827	75.86	0.0000E+00	-13.32	0.0000E+00	0.0000E+00	79.65	0.0000E+00	-13.01	92.06	87.70
181	-6.142	9.714	0.0000E+00	-6.933	0.0000E+00	0.0000E+00	14.02	-1.034	-9.396	23.42	22.29
182	-4.111	8.522	0.0000E+00	-16.35	0.0000E+00	0.0000E+00	22.73	-1.201	-17.12	39.85	36.01
183	2.714	-23.07	0.0000E+00	-23.44	0.0000E+00	0.0000E+00	16.76	0.0000E+00	-37.11	53.87	47.89
184	8.235	-29.54	0.0000E+00	-11.93	0.0000E+00	0.0000E+00	13.17	0.0000E+00	-34.48	47.66	42.90
185	5.048	-5.174	0.0000E+00	8.143	0.0000E+00	0.0000E+00	14.10	0.0000E+00	-14.22	28.32	25.23
186	5.234	5.160	0.0000E+00	-19.26	0.0000E+00	0.0000E+00	26.00	0.0000E+00	-15.60	41.60	37.49
187	16.19	-44.70	0.0000E+00	-19.36	0.0000E+00	0.0000E+00	25.06	5.995	-41.56	66.62	61.97
188	-2.919	94.72	0.0000E+00	-22.34	0.0000E+00	0.0000E+00	101.5	2.881	-12.62	114.2	109.6
189	10.23	15.39	0.0000E+00	-22.40	0.0000E+00	0.0000E+00	37.11	1.649	-13.34	50.46	45.34
190	23.37	-56.37	0.0000E+00	-22.46	0.0000E+00	0.0000E+00	32.23	6.948	-72.18	104.4	98.09
191	-4.393	92.56	0.0000E+00	-18.22	0.0000E+00	0.0000E+00	93.87	0.2255	-7.932	101.8	101.0
192	-0.8224E-01	30.05	0.0000E+00	-22.78	0.0000E+00	0.0000E+00	43.66	0.0000E+00	-13.69	57.35	52.00
193	3.526	-33.03	0.0000E+00	-23.35	0.0000E+00	0.0000E+00	15.33	0.0000E+00	-44.84	60.17	54.31
194	1.720	-46.11	0.0000E+00	-12.73	0.0000E+00	0.0000E+00	3.765	-0.1316E-03	-50.16	53.92	53.44
195	-2.079	-18.58	0.0000E+00	7.447	0.0000E+00	0.0000E+00	8.834	-0.3395	-29.15	37.98	35.34
196	-38.99	5.547	0.0000E+00	2.366	0.0000E+00	0.0000E+00	17.97	0.0000E+00	-51.41	69.38	62.84
197	-91.91	-49.73	0.0000E+00	3.995	0.0000E+00	0.0000E+00	6.014	-29.33	-118.3	124.4	111.7
198	-153.1	-2.327	0.0000E+00	-3.123	0.0000E+00	0.0000E+00	3.678	-5.978	-153.4	157.0	152.5
199	-149.1	-1.551	0.0000E+00	2.803	0.0000E+00	0.0000E+00	1.278	-2.749	-149.2	150.4	148.5
200	-101.4	2.110	0.0000E+00	-16.30	0.0000E+00	0.0000E+00	7.166	-2.070	-104.4	111.5	107.2
201	-49.11	-1.278	0.0000E+00	-3.232	0.0000E+00	0.0000E+00	1.738	-3.754	-49.37	52.11	49.31
202	-22.83	0.8970	0.0000E+00	-8.422	0.0000E+00	0.0000E+00	9.562	-5.228	-26.27	35.83	31.37
203	-24.62	81.99	0.0000E+00	6.716	0.0000E+00	0.0000E+00	88.55	0.6272	-31.80	120.3	112.1
204	-59.36	14.17	0.0000E+00	5.742	0.0000E+00	0.0000E+00	27.00	0.0000E+00	-72.19	99.19	89.32
205	-134.2	-55.11	0.0000E+00	8.844	0.0000E+00	0.0000E+00	9.772	-37.57	-161.5	171.3	155.4
206	-247.8	-3.770	0.0000E+00	3.803	0.0000E+00	0.0000E+00	4.344	-7.931	-248.0	252.3	246.4
207	-272.3	-2.821	0.0000E+00	10.28	0.0000E+00	0.0000E+00	1.290	-3.681	-272.8	274.1	271.6
208	-197.4	9.770	0.0000E+00	-20.65	0.0000E+00	0.0000E+00	12.31	0.0000E+00	-200.0	212.3	206.5
209	-125.6	-3.682	0.0000E+00	-23.05	0.0000E+00	0.0000E+00	3.130	-1.732	-130.7	133.8	131.5
210	-10.32	0.9154	0.0000E+00	-29.04	0.0000E+00	0.0000E+00	36.04	-1.740	-43.71	79.75	76.65
211	20.20	87.12	0.0000E+00	-9.682	0.0000E+00	0.0000E+00	92.46	19.95	-5.086	97.55	93.69
212	-17.55	30.47	0.0000E+00	-6.301	0.0000E+00	0.0000E+00	39.21	0.0000E+00	-26.29	65.50	58.07
213	-30.27	-29.87	0.0000E+00	-7.739	0.0000E+00	0.0000E+00	0.0000E+00	-16.45	-63.69	63.69	57.98
214	-64.31	-49.50	0.0000E+00	-16.82	0.0000E+00	0.0000E+00	0.0000E+00	-36.42	-77.38	77.38	68.78
215	-43.65	-31.68	0.0000E+00	-8.354	0.0000E+00	0.0000E+00	3.828	-20.61	-58.56	62.39	56.65
216	-61.80	3.939	0.0000E+00	16.65	0.0000E+00	0.0000E+00	15.54	-5.747	-67.66	83.20	75.73
217	-75.84	-7.828	0.0000E+00	1.555	0.0000E+00	0.0000E+00	1.842	-7.749	-77.76	79.60	75.31

IF300 2" SPACER DISK @ DEG. DEAD WEIGHT ANALYSIS 9.6488 JUN 11,1990 CP= 115.130

***** POST1 NODAL STRESS LISTING *****

LOAD STEP 1 ITERATION= 1 SECTION= 1
TIME= 0.00000E+00 LOAD CASE= 1

THE FOLLOWING X,Y,Z STRESSES ARE IN GLOBAL COORDINATES

NODE	SX	SY	SZ	SXY	SYZ	SXZ	SIG1	SIG2	SIG3	SI	SIGE
218	-92.96	-0.7539E-01	0.0000E+00	1.243	0.0000E+00	0.0000E+00	1.475	-1.374	-93.13	94.61	93.23
219	-80.53	15.36	0.0000E+00	-13.85	0.0000E+00	0.0000E+00	18.70	0.0000E+00	-83.87	102.6	95.32
220	-86.92	-8.351	0.0000E+00	-13.76	0.0000E+00	0.0000E+00	3.170	-8.226	-90.41	93.59	89.00
221	-94.73	-1.591	0.0000E+00	-3.679	0.0000E+00	0.0000E+00	1.337	-2.485	-95.18	96.51	94.69
222	-113.7	7.432	0.0000E+00	-2.983	0.0000E+00	0.0000E+00	11.18	-2.661	-114.8	126.0	119.7
223	-92.23	9.466	0.0000E+00	23.93	0.0000E+00	0.0000E+00	22.62	-5.738	-99.64	122.3	111.7
224	-110.6	-9.831	0.0000E+00	8.997	0.0000E+00	0.0000E+00	2.247	-9.580	-113.1	115.4	110.0
225	-133.6	-0.8338	0.0000E+00	8.693	0.0000E+00	0.0000E+00	2.048	-2.130	-134.3	136.4	134.4
226	-112.2	25.21	0.0000E+00	-13.31	0.0000E+00	0.0000E+00	28.58	0.0000E+00	-115.6	144.2	133.7
227	-119.4	6.150	0.0000E+00	-21.08	0.0000E+00	0.0000E+00	13.02	-2.882	-123.4	136.4	129.6
228	-132.4	-5.249	0.0000E+00	-23.87	0.0000E+00	0.0000E+00	2.784	-3.452	-137.8	139.8	136.8
229	-149.8	8.300	0.0000E+00	-22.40	0.0000E+00	0.0000E+00	14.15	-1.666	-153.9	168.1	161.0
230	-128.8	28.49	0.0000E+00	8.195	0.0000E+00	0.0000E+00	29.61	0.0000E+00	-129.9	159.5	149.6
231	-166.1	-17.37	0.0000E+00	8.239	0.0000E+00	0.0000E+00	0.0000E+00	-15.50	-168.0	168.0	160.9
232	-158.9	-25.10	0.0000E+00	-25.33	0.0000E+00	0.0000E+00	3.530	-19.89	-167.4	171.1	161.3
233	-100.4	-57.90	0.0000E+00	-44.02	0.0000E+00	0.0000E+00	6.759	-35.12	-129.9	136.7	123.5
234	-88.63	3.166	0.0000E+00	14.82	0.0000E+00	0.0000E+00	6.743	-0.9004	-91.31	98.05	94.71
235	-37.14	-13.13	0.0000E+00	6.233	0.0000E+00	0.0000E+00	0.0000E+00	-7.993	-42.28	42.28	39.26
236	-15.67	1.400	0.0000E+00	-0.3171	0.0000E+00	0.0000E+00	2.609	0.0000E+00	-16.87	19.47	18.32
237	-32.80	47.27	0.0000E+00	-0.1960	0.0000E+00	0.0000E+00	51.56	0.0000E+00	-37.09	88.64	77.96
238	-58.69	6.245	0.0000E+00	-3.603	0.0000E+00	0.0000E+00	13.67	-0.3143	-65.80	79.47	74.22
239	-88.35	-37.75	0.0000E+00	1.113	0.0000E+00	0.0000E+00	0.0000E+00	-28.34	-109.8	109.8	100.9
240	-183.3	-1.903	0.0000E+00	-4.126	0.0000E+00	0.0000E+00	0.0000E+00	-1.566	-183.7	183.7	182.9
241	-179.4	13.97	0.0000E+00	2.456	0.0000E+00	0.0000E+00	14.96	0.0000E+00	-180.4	195.3	188.3
242	-123.4	6.804	0.0000E+00	21.62	0.0000E+00	0.0000E+00	11.46	-0.3166	-127.7	139.2	134.3
243	-37.15	-15.93	0.0000E+00	14.19	0.0000E+00	0.0000E+00	3.850	-4.501	-52.43	56.28	52.92
244	23.90	1.153	0.0000E+00	7.102	0.0000E+00	0.0000E+00	26.09	0.0000E+00	-1.034	27.12	26.66
245	-1.178	58.72	0.0000E+00	4.754	0.0000E+00	0.0000E+00	69.79	7.156	-19.41	89.20	80.25
246	-53.34	28.70	0.0000E+00	-4.011	0.0000E+00	0.0000E+00	33.44	0.0000E+00	-60.08	93.53	85.09
247	-79.61	3.930	0.0000E+00	-7.860	0.0000E+00	0.0000E+00	13.74	-4.882	-84.54	98.29	90.89
248	-212.2	-6.816	0.0000E+00	-24.69	0.0000E+00	0.0000E+00	1.844	-5.730	-215.1	216.9	213.3
249	-301.6	15.68	0.0000E+00	-15.76	0.0000E+00	0.0000E+00	17.23	0.0000E+00	-303.2	320.4	312.3
250	-310.8	11.25	0.0000E+00	9.161	0.0000E+00	0.0000E+00	11.85	0.0000E+00	-311.4	323.3	317.6
251	-260.6	-11.94	0.0000E+00	11.74	0.0000E+00	0.0000E+00	0.0000E+00	-11.23	-261.3	261.3	255.9
252	-299.8	-3.814	0.0000E+00	-26.42	0.0000E+00	0.0000E+00	2.152	-1.526	-304.2	306.4	304.5
253	-210.0	-26.11	0.0000E+00	-85.28	0.0000E+00	0.0000E+00	39.13	-26.54	-248.7	287.8	263.8
254	0.9891	24.05	0.0000E+00	17.87	0.0000E+00	0.0000E+00	48.17	0.8157	-23.93	72.12	70.00
255	8.744	3.993	0.0000E+00	17.65	0.0000E+00	0.0000E+00	25.29	0.2725	-12.83	38.12	34.22
256	16.50	-6.935	0.0000E+00	17.43	0.0000E+00	0.0000E+00	36.95	10.93	-38.31	75.26	68.69
257	-1.510	33.28	0.0000E+00	19.09	0.0000E+00	0.0000E+00	58.08	-2.934	-23.27	81.27	79.24
258	6.018	42.37	0.0000E+00	17.65	0.0000E+00	0.0000E+00	50.80	4.318	-6.726	57.32	52.98
259	13.55	72.51	0.0000E+00	16.21	0.0000E+00	0.0000E+00	79.41	10.58	-3.934	83.35	77.14
260	-126.3	138.2	0.0000E+00	-52.74	0.0000E+00	0.0000E+00	169.9	0.0000E+00	-157.9	327.7	287.1

IP300 2" SPACER DISK @ DEG. DEAD WEIGHT ANALYSIS 9.6889 JUN 11,1990 CP= 115.510

***** POST1 NODAL STRESS LISTING *****

LOAD STEP 1 ITERATION= 1 SECTION= 1
TIME= 0.00000E+00 LOAD CASE= 1

THE FOLLOWING X,Y,Z STRESSES ARE IN GLOBAL COORDINATES

NODE	SX	SY	SZ	SXY	SYZ	SXZ	SIG1	SIG2	SIG3	SI	SIGE
261	-4.082	-76.70	0.0000E+00	8.901	0.0000E+00	0.0000E+00	2.436	-4.357	-78.86	81.30	78.12
262	-4.202	6.178	0.0000E+00	8.826	0.0000E+00	0.0000E+00	11.50	0.0000E+00	-11.32	23.02	20.06
263	-8.323	89.45	0.0000E+00	8.750	0.0000E+00	0.0000E+00	90.61	0.0000E+00	-9.488	100.1	96.03
264	-5.092	-72.68	0.0000E+00	8.364	0.0000E+00	0.0000E+00	1.288	-4.780	-74.28	75.57	72.74
265	-7.146	49.74	0.0000E+00	8.826	0.0000E+00	0.0000E+00	51.32	0.0000E+00	-8.719	60.03	56.33
266	-9.201	163.7	0.0000E+00	9.287	0.0000E+00	0.0000E+00	164.5	0.0000E+00	-10.02	174.6	169.9
267	-1.013	217.2	0.0000E+00	23.31	0.0000E+00	0.0000E+00	219.7	0.6717	-4.221	224.0	221.6
268	-3.714	-110.6	0.0000E+00	3.670	0.0000E+00	0.0000E+00	0.0000E+00	-3.588	-110.7	110.7	109.0
269	-2.472	6.745	0.0000E+00	4.413	0.0000E+00	0.0000E+00	8.364	0.0000E+00	-4.291	12.65	11.36
270	-1.230	122.2	0.0000E+00	5.157	0.0000E+00	0.0000E+00	122.4	0.0000E+00	-1.443	123.9	123.2
271	-2.260	-102.6	0.0000E+00	5.250	0.0000E+00	0.0000E+00	0.0000E+00	-1.986	-102.8	102.8	101.8
272	-1.052	46.28	0.0000E+00	4.413	0.0000E+00	0.0000E+00	46.70	0.0000E+00	-1.472	48.17	47.47
273	0.1564	200.3	0.0000E+00	3.377	0.0000E+00	0.0000E+00	200.6	0.9261E-01	0.0000E+00	200.6	200.5
274	31.12	209.5	0.0000E+00	27.19	0.0000E+00	0.0000E+00	214.1	46.56	0.0000E+00	214.1	195.0
1002	-34.42	4.860	0.0000E+00	0.8372	0.0000E+00	0.0000E+00	5.425	0.0000E+00	-34.99	60.41	57.92
1003	-35.28	-0.4905	0.0000E+00	7.694	0.0000E+00	0.0000E+00	0.8674	-0.2316	-36.41	37.27	36.73
1004	-45.35	-2.029	0.0000E+00	8.791	0.0000E+00	0.0000E+00	0.2851	-0.3812	-47.08	47.37	46.94
1005	-34.41	-0.1773	0.0000E+00	9.425	0.0000E+00	0.0000E+00	2.322	0.0000E+00	-36.91	39.23	38.14
1006	-23.64	-6.622	0.0000E+00	6.823	0.0000E+00	0.0000E+00	0.0000E+00	-4.213	-26.05	26.05	24.22
1007	2.424	4.720	0.0000E+00	3.167	0.0000E+00	0.0000E+00	18.77	0.0000E+00	-11.62	30.39	27.43
1008	-0.1284	-3.639	0.0000E+00	-4.080	0.0000E+00	0.0000E+00	14.73	0.0000E+00	-18.50	33.23	29.19
1009	-24.61	-0.1751	0.0000E+00	10.30	0.0000E+00	0.0000E+00	3.128	0.0000E+00	-29.91	33.04	32.97
1010	-26.47	-9.332	0.0000E+00	14.64	0.0000E+00	0.0000E+00	0.0000E+00	-0.9830	-35.02	35.02	34.54
1011	-19.91	-6.797	0.0000E+00	12.47	0.0000E+00	0.0000E+00	0.7605	0.0000E+00	-27.47	28.23	27.86
1012	-18.18	-7.967	0.0000E+00	11.33	0.0000E+00	0.0000E+00	0.0000E+00	-0.4588	-25.69	25.69	25.46
1013	-18.46	-8.582	0.0000E+00	12.84	0.0000E+00	0.0000E+00	0.3384	-0.8610E-01	-27.29	27.63	27.42
1014	-19.60	-11.22	0.0000E+00	15.12	0.0000E+00	0.0000E+00	0.3839	-0.8134E-01	-31.12	31.51	31.28
1015	-21.93	-14.96	0.0000E+00	18.09	0.0000E+00	0.0000E+00	0.4516	-0.4483	-36.87	37.32	36.87
1016	-24.82	-20.53	0.0000E+00	22.85	0.0000E+00	0.0000E+00	0.7092	-0.4007	-45.66	46.37	45.83
1017	-23.46	-27.24	0.0000E+00	27.60	0.0000E+00	0.0000E+00	2.452	0.0000E+00	-53.16	55.61	54.43
1018	-22.79	-34.99	0.0000E+00	27.85	0.0000E+00	0.0000E+00	0.1577	-0.5071	-57.43	57.59	57.26
1019	-13.55	-34.68	0.0000E+00	25.43	0.0000E+00	0.0000E+00	3.737	0.0000E+00	-51.97	55.71	53.95
1020	-8.044	-28.83	0.0000E+00	14.44	0.0000E+00	0.0000E+00	0.7344	-1.370	-36.24	36.97	35.97
1021	-3.537	-18.42	0.0000E+00	8.610	0.0000E+00	0.0000E+00	0.7377	-0.4647	-22.23	22.97	22.40
1022	-1.433	-11.35	0.0000E+00	4.070	0.0000E+00	0.0000E+00	0.5186	-0.6861	-12.82	13.34	12.87
1023	-0.4369	-6.335	0.0000E+00	1.642	0.0000E+00	0.0000E+00	0.3101	-0.3291	-6.773	7.083	6.788
1024	-0.3963E-01	-2.712	0.0000E+00	0.3087	0.0000E+00	0.0000E+00	0.2023	-0.1979	-2.756	2.958	2.786
1025	0.7838E-01	-0.4331	0.0000E+00	-0.3931	0.0000E+00	0.0000E+00	0.5243	-0.1250	-0.7541	1.279	1.197
1026	1.476	3.593	0.0000E+00	-1.921	0.0000E+00	0.0000E+00	4.770	0.3405	-0.4132E-01	4.811	4.632
1027	1.129	11.16	0.0000E+00	-4.218	0.0000E+00	0.0000E+00	12.76	0.3248	-0.7943	13.56	13.05
1028	-0.2368	17.92	0.0000E+00	-4.045	0.0000E+00	0.0000E+00	18.87	0.0000E+00	-1.191	20.06	19.51
1029	-0.6756	20.40	0.0000E+00	-1.957	0.0000E+00	0.0000E+00	20.64	0.0000E+00	-0.9131	21.55	21.11
1030	0.2727	19.22	0.0000E+00	-0.5716	0.0000E+00	0.0000E+00	19.24	0.2542	0.0000E+00	19.24	19.11

IF300 2" SPACER DISK 0 DEG. DEAD WEIGHT ANALYSIS 9.6898 JUN 11,1990 CP= 115.890

***** POST1 NODAL STRESS LISTING *****

LOAD STEP 1 ITERATION= 1 SECTION= 1
TIME= 0.00000E+00 LOAD CASE= 1

THE FOLLOWING X,Y,Z STRESSES ARE IN GLOBAL COORDINATES

NODE	SX	SY	SZ	SXY	SYZ	SXZ	SIG1	SIG2	SIG3	SI	SIGE
1031	-0.3661	17.80	0.0000E+00	-0.3858	0.0000E+00	0.0000E+00	17.81	0.0000E+00	-0.3743	18.18	18.00
1033	-32.89	11.83	0.0000E+00	2.602	0.0000E+00	0.0000E+00	12.89	0.0000E+00	-33.95	46.84	42.42
1034	-33.41	-1.469	0.0000E+00	5.031	0.0000E+00	0.0000E+00	0.4371	-1.119	-34.22	34.67	33.92
1035	-29.08	-0.8192	0.0000E+00	6.198	0.0000E+00	0.0000E+00	0.7743	-0.2845	-30.39	31.16	30.65
1036	-27.69	-0.3824	0.0000E+00	6.966	0.0000E+00	0.0000E+00	1.360	-0.1332E-01	-29.42	30.78	30.13
1037	-28.87	-3.579	0.0000E+00	7.689	0.0000E+00	0.0000E+00	0.8563	-2.202	-31.11	31.96	30.60
1038	-56.72	-0.3488	0.0000E+00	14.20	0.0000E+00	0.0000E+00	5.878	-1.658	-61.29	67.16	64.15
1040	-27.54	-0.2635	0.0000E+00	13.27	0.0000E+00	0.0000E+00	5.648	0.0000E+00	-33.45	39.10	36.62
1041	-15.79	-4.824	0.0000E+00	9.086	0.0000E+00	0.0000E+00	1.158	-0.8088	-20.96	22.12	21.26
1042	-17.17	-5.210	0.0000E+00	10.78	0.0000E+00	0.0000E+00	1.224	-0.5388E-01	-23.55	24.77	24.18
1043	-15.66	-6.375	0.0000E+00	10.45	0.0000E+00	0.0000E+00	0.8343	-0.4076	-22.46	23.30	22.72
1044	-15.54	-6.218	0.0000E+00	10.03	0.0000E+00	0.0000E+00	0.6302	-0.3034	-22.08	22.71	22.27
1045	-16.03	-7.087	0.0000E+00	10.71	0.0000E+00	0.0000E+00	0.3778	-0.1645	-23.33	23.71	23.45
1046	-16.61	-9.265	0.0000E+00	13.51	0.0000E+00	0.0000E+00	1.620	-0.5001	-26.97	28.59	27.64
1047	-17.60	-7.686	0.0000E+00	14.13	0.0000E+00	0.0000E+00	4.670	-0.1339	-29.82	34.49	32.59
1048	-14.26	-15.24	0.0000E+00	20.09	0.0000E+00	0.0000E+00	5.514	-0.1462	-36.87	42.39	40.21
1049	-9.095	-17.99	0.0000E+00	16.91	0.0000E+00	0.0000E+00	5.547	-0.3272	-32.30	37.85	35.84
1050	3.733	-18.43	0.0000E+00	9.738	0.0000E+00	0.0000E+00	9.329	0.4147	-24.44	33.77	30.92
1051	0.9158	-23.29	0.0000E+00	7.831	0.0000E+00	0.0000E+00	4.179	-0.5912	-25.97	30.14	28.22
1052	1.533	-15.97	0.0000E+00	3.002	0.0000E+00	0.0000E+00	2.913	-0.1633	-17.18	20.10	18.82
1053	0.4112	-11.59	0.0000E+00	2.324	0.0000E+00	0.0000E+00	1.523	-0.2413	-12.26	13.78	13.01
1054	0.4496	-6.599	0.0000E+00	0.1067	0.0000E+00	0.0000E+00	0.7989	-0.1283	-6.811	7.610	7.227
1055	0.2398	-3.655	0.0000E+00	-0.1735E-01	0.0000E+00	0.0000E+00	0.4293	-0.1068	-3.738	4.168	3.938
1056	0.5279	-1.828	0.0000E+00	-0.8023	0.0000E+00	0.0000E+00	0.9438	-0.7502E-01	-2.169	3.113	2.814
1057	1.568	-1.331	0.0000E+00	-1.487	0.0000E+00	0.0000E+00	2.270	0.0000E+00	-2.053	4.323	3.861
1058	1.202	-0.1090E-02	0.0000E+00	-2.339	0.0000E+00	0.0000E+00	3.993	0.3306E-01	-2.825	6.818	6.345
1059	-2.993	7.306	0.0000E+00	-1.634	0.0000E+00	0.0000E+00	7.898	0.0000E+00	-3.586	11.48	10.36
1060	-0.1926	8.350	0.0000E+00	-0.3343	0.0000E+00	0.0000E+00	8.421	0.2123	-0.4760	8.897	8.580
1061	-0.2372E-01	7.153	0.0000E+00	0.3490E-01	0.0000E+00	0.0000E+00	7.156	0.1175	-0.1447	7.301	7.174
1062	-0.3749	7.280	0.0000E+00	-0.4551E-01	0.0000E+00	0.0000E+00	7.281	0.0000E+00	-0.3758	7.657	7.476
1064	0.3726	49.02	0.0000E+00	1.672	0.0000E+00	0.0000E+00	60.45	3.737	-14.78	75.24	69.97
1065	20.52	-2.484	0.0000E+00	2.050	0.0000E+00	0.0000E+00	20.71	0.0000E+00	-2.673	23.39	22.19
1066	8.767	0.2492	0.0000E+00	3.264	0.0000E+00	0.0000E+00	10.47	0.4587E-02	-1.462	11.94	11.46
1067	-4.717	-0.7041	0.0000E+00	3.539	0.0000E+00	0.0000E+00	3.084	0.0000E+00	-8.503	11.59	11.20
1068	-25.83	0.1329	0.0000E+00	7.142	0.0000E+00	0.0000E+00	2.059	0.0000E+00	-27.75	29.81	28.97
1069	-70.51	0.1450	0.0000E+00	7.428	0.0000E+00	0.0000E+00	4.112	-3.123	-71.35	75.46	72.14
1070	-61.51	-3.771	0.0000E+00	15.07	0.0000E+00	0.0000E+00	4.161	-4.688	-66.75	70.91	67.05
1072	-11.99	78.27	0.0000E+00	20.60	0.0000E+00	0.0000E+00	84.20	0.0000E+00	-17.92	102.1	98.97
1073	1.029	6.433	0.0000E+00	5.362	0.0000E+00	0.0000E+00	12.25	2.832	-7.621	19.87	17.72
1074	-4.683	0.3602	0.0000E+00	6.520	0.0000E+00	0.0000E+00	6.156	0.1953	-10.67	16.83	15.59
1077	-0.9944	-42.41	0.0000E+00	11.82	0.0000E+00	0.0000E+00	10.20	-3.350	-50.26	60.46	56.80
1078	-2.354	16.76	0.0000E+00	-0.5434	0.0000E+00	0.0000E+00	16.82	0.0000E+00	-2.410	19.23	18.15
1079	-2.497	1.957	0.0000E+00	1.059	0.0000E+00	0.0000E+00	3.498	0.0000E+00	-4.039	7.537	6.675

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IF300 2" SPACER DISK 0 DEG. DEAD WEIGHT ANALYSIS 9.6891 JUN 11,1990 CP= 116.330

***** POST1 NODAL STRESS LISTING *****

LOAD STEP 1 ITERATION= 1 SECTION= 1
TIME= 0.00000E+00 LOAD CASE= 1

THE FOLLOWING X,Y,Z STRESSES ARE IN GLOBAL COORDINATES

NODE	SX	SY	SZ	SXY	SYZ	SXZ	SIG1	SIG2	SIG3	SI	SIGE
1080	-6.119	-3.412	0.0000E+00	3.994	0.0000E+00	0.0000E+00	0.5916	-0.5108	-9.613	10.20	9.732
1081	-11.97	-3.861	0.0000E+00	7.697	0.0000E+00	0.0000E+00	1.283	-0.3386	-16.78	18.07	17.33
1083	-4.472	-98.08	0.0000E+00	2.926	0.0000E+00	0.0000E+00	0.0000E+00	-4.159	-98.39	98.39	96.39
1084	-0.5628E-01	11.42	0.0000E+00	-1.843	0.0000E+00	0.0000E+00	11.78	0.1635	-0.5761	12.35	12.01
1085	-0.9559	4.285	0.0000E+00	-2.106	0.0000E+00	0.0000E+00	5.134	0.1231E-01	-1.817	6.952	6.303
1086	-3.322	0.8437E-01	0.0000E+00	-0.7267	0.0000E+00	0.0000E+00	1.479	-0.3609	-4.556	6.235	5.610
1087	-7.460	-1.247	0.0000E+00	2.876	0.0000E+00	0.0000E+00	0.7520	-0.1938	-9.266	10.02	9.597
1088	-13.05	-2.845	0.0000E+00	6.768	0.0000E+00	0.0000E+00	0.8625	-0.1313	-16.72	17.68	17.17
1090	-2.710	-86.84	0.0000E+00	-5.865	0.0000E+00	0.0000E+00	1.042	-2.936	-87.65	88.70	86.78
1091	0.1776	2.990	0.0000E+00	-2.847	0.0000E+00	0.0000E+00	3.421	0.1499	-2.403	7.823	7.363
1092	-0.4086	3.748	0.0000E+00	-3.455	0.0000E+00	0.0000E+00	5.708	0.0000E+00	-2.368	8.076	7.249
1093	-1.400	3.907	0.0000E+00	-2.761	0.0000E+00	0.0000E+00	5.236	0.0000E+00	-2.730	7.966	7.065
1094	-2.625	1.786	0.0000E+00	-0.2680	0.0000E+00	0.0000E+00	2.316	0.0000E+00	-3.155	5.471	4.834
1095	-5.681	0.1168	0.0000E+00	1.989	0.0000E+00	0.0000E+00	1.261	0.0000E+00	-6.825	8.086	7.556
1096	-12.04	-3.294	0.0000E+00	6.284	0.0000E+00	0.0000E+00	0.9712	-0.3133	-16.00	16.97	16.38
1097	-15.31	-4.764	0.0000E+00	10.30	0.0000E+00	0.0000E+00	2.499	-0.3916	-22.12	24.62	23.33
1099	-3.477	-9.344	0.0000E+00	-14.78	0.0000E+00	0.0000E+00	26.49	-3.738	-35.73	62.24	58.67
1100	-2.777	-10.45	0.0000E+00	-3.641	0.0000E+00	0.0000E+00	0.6688	-1.301	-12.60	13.26	12.40
1101	-0.6489	6.517	0.0000E+00	-2.846	0.0000E+00	0.0000E+00	8.011	0.4908	-2.634	10.65	9.513
1102	2.992	6.449	0.0000E+00	-1.164	0.0000E+00	0.0000E+00	7.330	2.325	-0.4148	7.745	7.061
1103	5.881	2.035	0.0000E+00	-0.6626	0.0000E+00	0.0000E+00	6.408	1.508	0.0000E+00	6.408	5.850
1104	6.313	0.9496	0.0000E+00	-1.195	0.0000E+00	0.0000E+00	6.765	0.5820	-0.8513E-01	6.851	6.550
1105	1.663	0.7893	0.0000E+00	-0.8911	0.0000E+00	0.0000E+00	4.605	0.4338	-2.586	7.191	6.479
1106	-9.160	-0.6231	0.0000E+00	4.350	0.0000E+00	0.0000E+00	3.327	0.0000E+00	-13.11	16.44	15.47
1107	-12.71	-5.130	0.0000E+00	13.18	0.0000E+00	0.0000E+00	8.757	-0.1169	-26.48	35.24	32.29
1109	-6.867	40.54	0.0000E+00	-9.836	0.0000E+00	0.0000E+00	43.03	0.0000E+00	-9.360	52.39	48.56
1110	-2.096	-8.329	0.0000E+00	0.5310	0.0000E+00	0.0000E+00	0.0000E+00	-0.8335	-9.392	9.392	9.212
1111	7.070	1.201	0.0000E+00	1.919	0.0000E+00	0.0000E+00	9.890	0.9980	-2.618	12.51	11.61
1112	19.55	0.1144	0.0000E+00	0.9333	0.0000E+00	0.0000E+00	19.60	0.4143	-0.3534	19.96	19.58
1113	29.96	-0.4833	0.0000E+00	1.636	0.0000E+00	0.0000E+00	30.05	0.1134	-0.6879	30.74	30.35
1114	40.92	2.300	0.0000E+00	1.032	0.0000E+00	0.0000E+00	40.97	2.253	0.0000E+00	40.97	39.90
1115	19.26	-11.31	0.0000E+00	-3.598	0.0000E+00	0.0000E+00	20.11	0.8934E-01	-12.25	32.36	29.22
1116	9.619	12.07	0.0000E+00	-0.2440	0.0000E+00	0.0000E+00	16.89	4.798	0.0000E+00	16.89	15.59
1117	14.94	3.215	0.0000E+00	2.885	0.0000E+00	0.0000E+00	16.52	3.570	-1.943	18.47	16.78
1118	20.48	1.206	0.0000E+00	-0.2676	0.0000E+00	0.0000E+00	20.55	1.137	0.0000E+00	20.55	20.01
1119	20.71	0.5305	0.0000E+00	-1.748	0.0000E+00	0.0000E+00	20.88	0.4814	-0.1209	21.00	20.71
1120	22.98	0.7511	0.0000E+00	-2.875	0.0000E+00	0.0000E+00	23.37	0.4558	-0.9782E-01	23.47	23.20
1121	16.20	2.480	0.0000E+00	-4.498	0.0000E+00	0.0000E+00	20.25	1.974	-1.546	21.80	20.32
1122	9.059	2.888	0.0000E+00	6.104	0.0000E+00	0.0000E+00	18.15	3.126	-9.331	27.48	24.81
1124	-10.24	39.99	0.0000E+00	-1.341	0.0000E+00	0.0000E+00	40.45	0.0000E+00	-10.70	51.14	46.97
1125	2.013	-9.256	0.0000E+00	1.329	0.0000E+00	0.0000E+00	4.452	-1.235	-10.46	14.91	13.24
1126	3.961	1.414	0.0000E+00	1.329	0.0000E+00	0.0000E+00	5.734	0.3640	-0.9427	6.697	6.151
1127	2.691	0.2013	0.0000E+00	1.329	0.0000E+00	0.0000E+00	3.804	0.6819E-01	-0.9795	4.783	4.457

IP300 2" SPACER DISK 0 DEG. DEAD WEIGHT ANALYSIS 9.6893 JUN 11,1990 CP= 116.720

***** POST1 NODAL STRESS LISTING *****

LOAD STEP 1 ITERATION= 1 SECTION= 1
TIME= 0.00000E+00 LOAD CASE= 1

THE FOLLOWING X,Y,Z STRESSES ARE IN GLOBAL COORDINATES

NODE	SX	SY	SZ	SXY	SYZ	SXZ	SIG1	SIG2	SIG3	SI	SIGE
1128	3.524	-1.039	0.0000E+00	1.329	0.0000E+00	0.0000E+00	4.093	0.0000E+00	-1.608	5.702	5.184
1129	3.565	4.401	0.0000E+00	1.329	0.0000E+00	0.0000E+00	6.319	1.835	-0.1878	6.506	5.828
1130	8.416	-17.93	0.0000E+00	-2.926	0.0000E+00	0.0000E+00	9.354	0.0000E+00	-18.87	28.22	25.04
1131	11.26	3.343	0.0000E+00	-5.056	0.0000E+00	0.0000E+00	15.38	2.889	-3.658	19.03	17.24
1133	2.729	52.33	0.0000E+00	8.209	0.0000E+00	0.0000E+00	54.36	6.359	-5.666	60.03	55.32
1134	8.614	-10.18	0.0000E+00	2.127	0.0000E+00	0.0000E+00	10.44	-1.377	-10.64	21.08	18.71
1135	-3.322	1.628	0.0000E+00	0.7392	0.0000E+00	0.0000E+00	2.134	0.0000E+00	-3.828	5.962	5.259
1136	-12.13	0.2882	0.0000E+00	1.725	0.0000E+00	0.0000E+00	0.9534	-0.1871	-12.61	13.56	13.11
1137	-23.08	-1.595	0.0000E+00	1.002	0.0000E+00	0.0000E+00	0.0000E+00	-1.544	-23.13	23.13	22.41
1138	-33.09	6.502	0.0000E+00	1.626	0.0000E+00	0.0000E+00	6.577	0.0000E+00	-33.07	39.65	36.85
1139	-13.93	-21.06	0.0000E+00	4.752	0.0000E+00	0.0000E+00	3.959	-8.383	-30.56	34.52	31.22
1140	8.583	6.946	0.0000E+00	7.251	0.0000E+00	0.0000E+00	20.82	1.837	-7.143	27.96	24.96
1141	23.20	22.54	0.0000E+00	5.597	0.0000E+00	0.0000E+00	35.81	9.937	0.0000E+00	35.81	32.28
1142	38.12	-0.7856	0.0000E+00	3.001	0.0000E+00	0.0000E+00	39.04	0.0000E+00	-1.702	40.74	39.92
1143	26.67	1.234	0.0000E+00	-0.3679	0.0000E+00	0.0000E+00	26.69	1.215	0.0000E+00	26.69	26.11
1144	30.14	0.1885E-01	0.0000E+00	-1.288	0.0000E+00	0.0000E+00	30.19	0.1975	-0.2356	30.43	30.21
1145	36.46	0.7909	0.0000E+00	-2.185	0.0000E+00	0.0000E+00	36.59	0.6799	-0.2632E-01	36.62	36.27
1146	57.19	0.5362	0.0000E+00	-6.869	0.0000E+00	0.0000E+00	58.10	0.2498	-0.6248	58.73	58.30
1147	45.74	25.70	0.0000E+00	-5.413	0.0000E+00	0.0000E+00	54.89	16.55	0.0000E+00	54.89	49.41
1148	20.20	5.662	0.0000E+00	-1.938	0.0000E+00	0.0000E+00	24.76	5.661	-4.553	29.31	26.27
1149	9.807	-22.78	0.0000E+00	1.538	0.0000E+00	0.0000E+00	11.54	-0.8884E-01	-24.42	35.96	32.24
1151	-7.244	12.78	0.0000E+00	16.14	0.0000E+00	0.0000E+00	39.20	-6.053	-27.61	66.80	63.44
1152	0.3323	34.85	0.0000E+00	14.81	0.0000E+00	0.0000E+00	47.87	3.330	-16.21	64.08	61.18
1153	-6.166	8.446	0.0000E+00	15.09	0.0000E+00	0.0000E+00	18.78	0.0000E+00	-16.58	35.37	31.33
1154	-12.66	-16.87	0.0000E+00	15.37	0.0000E+00	0.0000E+00	24.55	-9.600	-44.49	69.04	62.67
1155	-5.637	30.16	0.0000E+00	-6.032	0.0000E+00	0.0000E+00	31.46	0.0000E+00	-6.927	38.38	36.09
1156	-0.7073	14.64	0.0000E+00	-7.032	0.0000E+00	0.0000E+00	18.32	0.2591	-4.648	22.97	21.19
1157	3.378	-15.44	0.0000E+00	-2.123	0.0000E+00	0.0000E+00	5.144	-0.7108E-01	-17.13	22.27	20.38
1159	-2.177	-74.18	0.0000E+00	7.158	0.0000E+00	0.0000E+00	2.211	-3.006	-75.56	77.77	75.30
1160	-4.945	113.6	0.0000E+00	6.454	0.0000E+00	0.0000E+00	114.3	0.0000E+00	-3.614	119.9	117.3
1161	-3.101	9.136	0.0000E+00	6.265	0.0000E+00	0.0000E+00	12.33	0.0000E+00	-6.296	18.63	16.53
1162	-1.156	-97.03	0.0000E+00	6.076	0.0000E+00	0.0000E+00	1.496	-2.297	-97.69	99.38	97.45
1163	1.617	8.129	0.0000E+00	-0.7621	0.0000E+00	0.0000E+00	8.295	1.451	0.0000E+00	8.295	7.721
1164	1.161	8.146	0.0000E+00	-3.044	0.0000E+00	0.0000E+00	9.772	0.5994	-1.065	10.84	10.15
1165	1.704	-5.825	0.0000E+00	-4.207	0.0000E+00	0.0000E+00	3.750	0.0000E+00	-7.872	11.62	10.34
1166	2.410	-11.74	0.0000E+00	-1.088	0.0000E+00	0.0000E+00	2.900	0.0000E+00	-12.23	15.13	13.96
1168	-4.470	-95.91	0.0000E+00	-1.485	0.0000E+00	0.0000E+00	0.0000E+00	-4.268	-96.11	96.11	94.05
1169	-1.784	128.5	0.0000E+00	-2.656	0.0000E+00	0.0000E+00	128.7	0.0000E+00	-1.984	130.6	129.7
1170	-3.197	8.441	0.0000E+00	-2.560	0.0000E+00	0.0000E+00	10.16	0.0000E+00	-4.920	15.08	13.44
1171	-4.609	-110.5	0.0000E+00	-2.463	0.0000E+00	0.0000E+00	0.0000E+00	-4.332	-110.7	110.7	108.6
1172	0.1986	3.271	0.0000E+00	-1.354	0.0000E+00	0.0000E+00	4.199	0.3370	-1.066	5.265	5.049
1173	0.5439	1.677	0.0000E+00	-2.164	0.0000E+00	0.0000E+00	3.375	0.1832E-01	-1.172	4.548	4.138
1174	1.337	-4.045	0.0000E+00	-3.376	0.0000E+00	0.0000E+00	2.991	0.0000E+00	-5.699	8.690	7.670

IP300 2" SPACER DISK 0 DEG. DEAD WEIGHT ANALYSIS 9.6894 JUN 11,1990 CP= 117.100

***** POST1 NODAL STRESS LISTING *****

LOAD STEP 1 ITERATION= 1 SECTION= 1
TIME= 0.00000E+00 LOAD CASE= 1

THE FOLLOWING X,Y,Z STRESSES ARE IN GLOBAL COORDINATES

NODE	SX	SY	SZ	SXY	SYZ	SXZ	SIG1	SIG2	SIG3	SI	SIGE
1175	1.630	-7.506	0.0000E+00	-2.463	0.0000E+00	0.0000E+00	2.465	0.0000E+00	-8.261	10.69	9.755
1177	-2.233	-49.81	0.0000E+00	-10.64	0.0000E+00	0.0000E+00	7.125	-3.748	-55.42	62.55	58.59
1178	-7.106	75.31	0.0000E+00	-11.36	0.0000E+00	0.0000E+00	78.00	0.0000E+00	-9.794	87.79	84.20
1179	-4.037	8.980	0.0000E+00	-11.38	0.0000E+00	0.0000E+00	16.20	0.0000E+00	-11.25	27.45	24.10
1180	-0.9675	-58.39	0.0000E+00	-11.41	0.0000E+00	0.0000E+00	6.855	-3.286	-62.93	69.79	63.91
1181	-0.9631	1.713	0.0000E+00	0.2511	0.0000E+00	0.0000E+00	2.632	0.0000E+00	-1.882	4.514	4.166
1182	0.1362	-3.820	0.0000E+00	-1.627	0.0000E+00	0.0000E+00	1.674	-0.1816	-5.377	7.251	6.713
1183	0.7999	-3.940	0.0000E+00	-3.578	0.0000E+00	0.0000E+00	2.615	0.0000E+00	-5.955	8.770	7.771
1184	0.2129	-4.725	0.0000E+00	-2.618	0.0000E+00	0.0000E+00	1.398	0.0000E+00	-5.910	7.308	6.750
1185	0.4004	-4.320	0.0000E+00	-1.070	0.0000E+00	0.0000E+00	0.6819	0.0000E+00	-4.602	5.284	4.988
1187	-5.720	61.28	0.0000E+00	-19.15	0.0000E+00	0.0000E+00	69.45	0.5339	-14.43	83.88	82.78
1188	9.875	-41.20	0.0000E+00	-20.11	0.0000E+00	0.0000E+00	23.65	4.937	-39.92	63.57	60.67
1189	-1.446	8.066	0.0000E+00	-20.21	0.0000E+00	0.0000E+00	25.53	0.0000E+00	-18.91	44.43	39.80
1190	-12.77	59.95	0.0000E+00	-20.31	0.0000E+00	0.0000E+00	69.72	-1.624	-20.92	90.64	88.44
1191	5.338	-14.17	0.0000E+00	-4.937	0.0000E+00	0.0000E+00	7.357	2.813	-18.20	25.76	23.79
1192	1.212	-7.054	0.0000E+00	-5.146	0.0000E+00	0.0000E+00	5.373	-0.2700	-10.94	16.32	14.58
1193	-4.803	-0.6605	0.0000E+00	-3.376	0.0000E+00	0.0000E+00	2.391	-0.1371	-6.917	9.308	8.431
1194	-2.842	-2.944	0.0000E+00	-0.6612	0.0000E+00	0.0000E+00	0.7133E-01	-0.8836	-4.872	4.944	4.619
1195	0.3422	-4.002	0.0000E+00	-0.8308	0.0000E+00	0.0000E+00	0.8723	-0.1519	-4.480	5.453	5.063
1197	-8.644	59.86	0.0000E+00	3.645	0.0000E+00	0.0000E+00	64.08	5.893	-20.76	86.84	79.91
1198	-2.396	1.284	0.0000E+00	-7.112	0.0000E+00	0.0000E+00	10.58	-3.556	-8.336	18.92	17.33
1199	-27.23	-0.6677	0.0000E+00	-3.021	0.0000E+00	0.0000E+00	2.464	-2.792	-27.57	30.04	28.11
1200	-72.15	2.353	0.0000E+00	-15.15	0.0000E+00	0.0000E+00	7.885	-1.690	-75.99	83.88	79.55
1201	-116.7	-1.350	0.0000E+00	4.760	0.0000E+00	0.0000E+00	1.610	-2.721	-116.9	118.6	116.5
1202	-110.6	-2.038	0.0000E+00	-0.2802	0.0000E+00	0.0000E+00	3.787	-3.637	-110.2	114.0	109.6
1203	-56.88	-49.05	0.0000E+00	5.988	0.0000E+00	0.0000E+00	8.476	-20.66	-93.75	102.2	91.33
1204	-10.91	5.628	0.0000E+00	2.865	0.0000E+00	0.0000E+00	27.16	0.0000E+00	-32.44	59.60	52.88
1205	33.76	61.13	0.0000E+00	3.361	0.0000E+00	0.0000E+00	86.75	17.26	-9.092	95.82	87.61
1206	67.74	2.236	0.0000E+00	-6.453	0.0000E+00	0.0000E+00	68.81	3.329	-4.154	72.96	68.71
1207	45.68	-0.2900	0.0000E+00	-1.776	0.0000E+00	0.0000E+00	46.01	2.172	-2.789	48.80	46.53
1208	-12.82	0.4281E-01	0.0000E+00	-16.92	0.0000E+00	0.0000E+00	19.93	0.0000E+00	-32.70	52.63	46.86
1209	-65.21	-0.7629	0.0000E+00	-2.976	0.0000E+00	0.0000E+00	1.152	-1.707	-65.42	66.57	63.20
1210	-89.89	-2.491	0.0000E+00	-4.562	0.0000E+00	0.0000E+00	1.242	-3.427	-90.20	91.44	89.21
1211	-57.37	-18.09	0.0000E+00	-3.940	0.0000E+00	0.0000E+00	0.0000E+00	-14.47	-60.79	60.79	55.68
1212	-28.59	-4.799	0.0000E+00	-2.301	0.0000E+00	0.0000E+00	0.1722	-3.069	-30.49	30.66	29.24
1213	-14.20	3.689	0.0000E+00	1.333	0.0000E+00	0.0000E+00	4.937	0.0000E+00	-15.43	20.38	18.71
1214	-2.806	-2.377	0.0000E+00	3.127	0.0000E+00	0.0000E+00	1.648	-0.7307	-6.103	7.752	6.960
1215	1.214	-6.018	0.0000E+00	0.5035E-01	0.0000E+00	0.0000E+00	2.053	0.0000E+00	-6.837	8.910	8.239
1217	-75.68	6.358	0.0000E+00	-2.827	0.0000E+00	0.0000E+00	9.379	-1.978	-76.72	86.10	81.05
1218	-59.77	-0.7199	0.0000E+00	-3.452	0.0000E+00	0.0000E+00	1.351	-1.573	-60.26	61.62	60.24
1219	-54.27	-8.617	0.0000E+00	-13.47	0.0000E+00	0.0000E+00	3.809	-7.083	-59.62	63.43	59.51
1220	-48.29	16.13	0.0000E+00	-12.23	0.0000E+00	0.0000E+00	20.48	0.0000E+00	-52.63	73.11	66.33
1221	-56.39	-0.5956	0.0000E+00	3.677	0.0000E+00	0.0000E+00	1.456	-1.522	-56.92	58.37	56.96

IF300 2" SPACER DISK @ DES. DEAD WEIGHT ANALYSIS 9.6893 JUN 11,1990 CP= 117.540

***** POST1 NODAL STRESS LISTING *****

LOAD STEP 1 ITERATION= 1 SECTION= 1
TIME= 0.000000E+00 LOAD CASE= 1

THE FOLLOWING X,Y,Z STRESSES ARE IN GLOBAL COORDINATES

NODE	SX	SY	SZ	SXY	SYZ	SXZ	SIG1	SIG2	SIG3	SI	SIGE
1222	-39.65	-6.936	0.0000E+00	3.904	0.0000E+00	0.0000E+00	2.059	-5.045	-43.60	45.66	42.81
1223	-30.77	3.196	0.0000E+00	18.54	0.0000E+00	0.0000E+00	19.14	-4.343	-42.37	61.51	54.79
1224	-40.34	7.849	0.0000E+00	-1.820	0.0000E+00	0.0000E+00	11.74	-2.037	-42.18	53.93	48.69
1225	-21.54	-1.036	0.0000E+00	-2.428	0.0000E+00	0.0000E+00	1.643	-1.492	-22.73	24.37	23.09
1226	-22.48	-11.08	0.0000E+00	-13.92	0.0000E+00	0.0000E+00	4.701	-4.807	-33.46	38.16	35.53
1227	-16.68	11.63	0.0000E+00	-14.52	0.0000E+00	0.0000E+00	19.46	0.0000E+00	-24.48	43.94	38.66
1228	-17.71	-1.262	0.0000E+00	-3.213	0.0000E+00	0.0000E+00	1.129	-1.493	-18.60	19.72	18.56
1229	-6.515	-4.157	0.0000E+00	-2.660	0.0000E+00	0.0000E+00	3.263	-0.8107	-13.13	16.39	14.86
1230	-7.355	-4.678	0.0000E+00	3.601	0.0000E+00	0.0000E+00	3.238	-1.541	-13.71	16.94	15.44
1231	-2.480	3.687	0.0000E+00	5.293	0.0000E+00	0.0000E+00	6.777	0.0000E+00	-5.570	12.35	10.79
1232	-1.574	0.6712	0.0000E+00	4.702	0.0000E+00	0.0000E+00	4.861	0.0000E+00	-5.765	10.63	9.348
1233	0.4987	-14.67	0.0000E+00	2.132	0.0000E+00	0.0000E+00	1.500	0.0000E+00	-15.67	17.17	16.49
1235	-126.7	11.43	0.0000E+00	1.458	0.0000E+00	0.0000E+00	12.31	0.0000E+00	-127.6	139.9	134.2
1236	-127.5	-0.7722	0.0000E+00	-3.882	0.0000E+00	0.0000E+00	0.2885	-0.7291	-127.9	128.2	127.7
1237	-62.78	-37.35	0.0000E+00	0.1372	0.0000E+00	0.0000E+00	0.6396	-19.00	-81.99	82.65	75.23
1238	-31.52	6.891	0.0000E+00	-3.221	0.0000E+00	0.0000E+00	17.35	0.0000E+00	-41.97	59.32	56.01
1239	-0.2496	51.28	0.0000E+00	1.806	0.0000E+00	0.0000E+00	59.11	7.028	-15.10	74.21	67.35
1240	23.65	0.1585	0.0000E+00	2.594	0.0000E+00	0.0000E+00	24.77	0.0000E+00	-0.9422	25.74	25.27
1241	-8.959	-11.81	0.0000E+00	8.088	0.0000E+00	0.0000E+00	9.235	-1.503	-28.30	37.74	33.23
1242	-68.38	1.568	0.0000E+00	16.98	0.0000E+00	0.0000E+00	7.881	-1.549	-72.94	80.63	76.89
1243	-117.1	13.46	0.0000E+00	3.214	0.0000E+00	0.0000E+00	14.75	0.0000E+00	-118.4	133.2	126.5
1244	-125.5	-1.781	0.0000E+00	-3.079	0.0000E+00	0.0000E+00	0.0000E+00	-1.443	-123.9	123.9	123.2
1245	-58.40	-37.39	0.0000E+00	0.9407	0.0000E+00	0.0000E+00	0.8856	-16.37	-80.29	81.18	74.30
1246	-18.64	0.4327	0.0000E+00	-3.144	0.0000E+00	0.0000E+00	14.18	0.0000E+00	-32.39	46.57	42.30
1247	10.14	35.98	0.0000E+00	-0.8582	0.0000E+00	0.0000E+00	49.21	8.597	-11.76	60.97	54.75
1248	54.47	-1.762	0.0000E+00	-3.449	0.0000E+00	0.0000E+00	54.82	0.0000E+00	-2.110	56.93	53.92
1249	59.92	-3.824	0.0000E+00	-0.7579	0.0000E+00	0.0000E+00	60.44	0.0000E+00	-6.349	66.79	63.86
1250	44.03	-0.6152	0.0000E+00	6.185	0.0000E+00	0.0000E+00	45.02	0.6110	-2.208	47.22	45.93
1251	19.27	1.714	0.0000E+00	4.824	0.0000E+00	0.0000E+00	20.51	0.7773	-0.3056	20.82	20.30
1252	-2.450	3.741	0.0000E+00	4.252	0.0000E+00	0.0000E+00	6.884	1.872	-7.464	14.35	12.85
1253	-8.443	-25.84	0.0000E+00	3.228	0.0000E+00	0.0000E+00	0.0000E+00	-7.275	-27.01	27.01	24.44
1254	10.19	-7.577	0.0000E+00	17.32	0.0000E+00	0.0000E+00	33.01	7.754	-38.16	71.17	66.64
1255	2.489	8.410	0.0000E+00	17.65	0.0000E+00	0.0000E+00	24.45	0.6017	-14.15	38.59	34.32
1256	-5.209	31.28	0.0000E+00	17.98	0.0000E+00	0.0000E+00	52.08	-4.317	-21.69	73.77	71.81
1257	7.634	-1.937	0.0000E+00	17.77	0.0000E+00	0.0000E+00	36.24	7.099	-37.62	73.87	69.73
1258	0.1788	-1.934	0.0000E+00	17.65	0.0000E+00	0.0000E+00	17.89	0.0000E+00	-19.65	37.54	33.36
1259	-7.297	-1.207	0.0000E+00	17.53	0.0000E+00	0.0000E+00	34.93	-6.678	-36.75	71.68	67.86
1260	0.1952	-34.22	0.0000E+00	2.299	0.0000E+00	0.0000E+00	0.3656	0.0000E+00	-34.39	34.76	34.58
	-7.148	88.94	0.0000E+00	8.880	0.0000E+00	0.0000E+00	90.28	0.0000E+00	-8.487	98.77	95.13
	-5.044	10.47	0.0000E+00	8.826	0.0000E+00	0.0000E+00	15.03	0.0000E+00	-9.608	24.64	21.65
	-2.940	-69.35	0.0000E+00	8.771	0.0000E+00	0.0000E+00	2.981	-3.733	-71.52	74.50	71.39
1264	-6.057	96.81	0.0000E+00	8.730	0.0000E+00	0.0000E+00	97.94	0.0000E+00	-7.181	105.1	102.0
1265	-4.018	-2.091	0.0000E+00	8.826	0.0000E+00	0.0000E+00	6.268	0.0000E+00	-12.38	18.65	16.63

```
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     FOR SUPPORT CALL STEVE PORTER      PHONE (206) 874-2233     TWX

 IF300 2" SPACER DISK @ DEG. DEAD WEIGHT ANALYSIS                          9.6896  JUN 11,1990 CP=    117.930

         ***** POST1 NODAL STRESS LISTING *****

 LOAD STEP     1  ITERATION=     1  SECTION=  1
 TIME=   0.00000E+00       LOAD CASE=  1

 THE FOLLOWING X,Y,Z STRESSES ARE IN GLOBAL COORDINATES

  NODE      SX          SY          SZ          SXY         SYZ         SXZ         SIG1        SIG2        SIG3        SI          SIGE
  1266   -1.979      -99.64      0.0000E+00   8.922      0.0000E+00  0.0000E+00   2.742      -3.309      -101.1      103.8       100.9
  1267   -0.3116     -30.77      0.0000E+00   0.9404     0.0000E+00  0.0000E+00   0.0000E+00 -0.2766     -30.80      30.80       30.67
  1268   -1.440      122.7       0.0000E+00   4.527      0.0000E+00  0.0000E+00   122.9       0.0000E+00 -1.604      124.5       123.7
  1269   -2.673      10.06       0.0000E+00   4.413      0.0000E+00  0.0000E+00   11.44       0.0000E+00 -4.059      15.50       13.96
  1270   -3.906     -102.3       0.0000E+00   4.300      0.0000E+00  0.0000E+00   0.0000E+00 -3.719      -102.5      102.5       100.7
  1271   -2.169      129.4       0.0000E+00   4.833      0.0000E+00  0.0000E+00   129.6       0.0000E+00 -2.346      131.9       130.8
  1272   -3.370     -1.372       0.0000E+00   4.413      0.0000E+00  0.0000E+00   2.172       0.0000E+00 -6.914      9.086       8.281
  1273   -4.570     -133.7       0.0000E+00   3.994      0.0000E+00  0.0000E+00   0.0000E+00 -4.447      -133.8      133.8       131.7
  1274   -0.3721     -30.05      0.0000E+00   0.4995     0.0000E+00  0.0000E+00   0.0000E+00 -0.3637     -30.06      30.06       29.88

 MINIMUMS
 NODE        29          29          1           39          1           1           2           29          29          1025        1025
 VALUE     -368.4      -331.1      0.0000E+00  -91.47      0.0000E+00  0.0000E+00  0.0000E+00  -259.8      -440.5      1.279       1.197

 MAXIMUMS
 NODE        31          267         1           19          1           1           267         274         273         29          29
 VALUE      72.57       217.2      0.0000E+00   56.28      0.0000E+00  0.0000E+00   218.7       46.58      0.0000E+00   440.5       389.0

 ***** ROUTINE COMPLETED *****  CP =       118.200

 /EOF ENCOUNTERED ON FILE16

 FILE7 AFWRITE OR SFWRITE WARNING MESSAGES =   1
 NUMBER OF SOLUTION PHASE WARNING MESSAGES =   0

 ***** RUN COMPLETED *****  CP=      118.7000   TIME=    9.6898
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
/OUTPUT.PS25X17.RES
/PREP7
/TITLE.POISON SHEET 30' DROP ANALYSIS 1/4" X 17 3/16" 90 DEG.
KAN.2
KAY.3.1
ET.1.3
ET.2.21...4
EX.1.25.8E6
NUXY.1.0.29
DENS.1.0.000725
GAMMA.0.02.20
C*** REAL CONSTANTS
R.1.0.25.0.0013.0.25
C*** NODES
N.1.0.0
N.11.17.1875.0
FILL
C*** ELEMENTS
E.1.2
EGEN.10.1.-1
ITER.1.1.1
C*** BOUNDARY CONDITIONS
D.1.UY.0.0
D.1.UX.0.0
D.11.UY.0.0
ITER.1.1.1
M.6.UY
M.11.UX
TOTAL.5
AFWRITE
FINISH
/INPUT.27
FINISH
/PREP7
RESUME
KAN.5
KAY.3
C*** INITIAL CONDITIONS AT REST
TIME.0
ACEL..0
LWRITE
TIME.0.3E-3
C*** LOADING STEP 1
ACEL..54096
ITER.20.0.1
LWRITE
C*** LOADING STEP 2
TIME.0.48E-3
ITER.20.0.1
ACEL..23995
LWRITE
C*** LOADING STEP 3
TIME.15.8E-3
ACEL..23995
ITER.100.0.1
LWRITE
C*** LOADING STEP 4
TIME.30.3E-3
ITER.25.0.1
ACEL..0.0
LWRITE
C*** LOADING STEP 5
TIME.0.05
ITER.200.0.1
LWRITE
SLOAD.1
AFWRITE
FINISH
/LNFREQ.5
/INPUT.27
FINISH
/POST26
FILE.10
```

```
DISP.2.6.UY
DISP.3.11.UX
/GRAPH.LABX.SEC.
/GRAPH.LABY.IN.
/TITLE.1/4" X 17 3/16" POISON SHEET 30' 90 DEG. SIDE DROP DISPLACEMENT
/SHOW.PLOT1..1
PLVAR.2
/SHOW.PLOT2..1
PLVAR.3
FINISH
/STRESS..5
TIME.50E-3
NSTRES.100
END
FINISH
/POST26
ESTR.4.5.11.SB
RFORCE.5.1.FY
RFORCE.6.11.FY
/TITLE.1/4" X 17 3/16" POISON SHEET 30' SIDE DROP BENDING STRESS
/GRAPH.LABY.PSI
/SHOW.PLOT3..1
PLVAR.4
/SHOW.PLOT4..1
/TITLE.1/4" X 17 3/16" POISON SHEET 30' SIDE DROP END REACTIONS
/GRAPH.LABY.#/IN
PLVAR.5.6
FINISH
/OUTPUT
/EOF
```

```
********** ANSYS OUTPUT DATA LISTING **********

 *** ANSYS REV 4.4           38122-PC/LIN-4.4 CP=    7.420 ****
 FOR SUPPORT CALL ROBERT QUINN      PHONE (408) 281-6151    TWX

NEW TITLE= POISON SHEET 30' DROP ANALYSIS 1/4" X 17 3/16" 90 DEG.

VARIABLE  2 IS     6 UY

VARIABLE  3 IS    11 UX

       SUMMARY OF VARIABLES STORED THIS STEP AND EXTREME VALUES
VARI TYPE  IDENTIFIERS  NAME   MINIMUM    AT TIME     MAXIMUM   AT TIME

  2 DISP     6  UY    6  UY   -0.2857     0.6875E-02 0.1413     0.4113E-01
  3 DISP    11  UX   11  UX   -0.7488E-19 0.7106E-03 0.2441E-19 0.3153E-01

VARIABLE  4  IS ELEMENT     5  ITEM  11  NAME= 5    SB

VARIABLE  5 IS REACTION FORCE     1 FY

VARIABLE  6 IS REACTION FORCE    11 FY

       SUMMARY OF VARIABLES STORED THIS STEP AND EXTREME VALUES
VARI TYPE  IDENTIFIERS  NAME   MINIMUM    AT TIME     MAXIMUM   AT TIME

  4 ESTR     5  11    5  SB   -0.1626E+05 0.4100E-01 0.3192E+05 0.7007E-02
  5 RFOR     1  FY    1  FY    -33.60     0.4150E-01  71.01     0.6495E-02
  6 RFOR    11  FY   11  FY    -26.37     0.4150E-01  54.79     0.6495E-02

***** ROUTINE COMPLETED *****  CP =       103.040
```

********** ANSYS INPUT DATA LISTING (FILE18) **********

```
/OUTPUT.PS516X19.RES
/PREP7
/TITLE.POISON SHEET 30' DROP ANALYSIS 5/16" X 19 1/16" 90 DEG.
KAN.2
KAY.3.1
ET.1.3
ET.2.21...4
EX.1.25.8E6
NUXY.1.0.29
DENS.1.0.000725
GAMMA.0.02.20
C*** REAL CONSTANTS
R.1.0.3125.0.002543.0.3125
C*** NODES
N.1.0.0
N.11.19.0625.0
FILL
C*** ELEMENTS
E.1.2
EGEN.10.1.-1
ITER.1.1.1
C*** BOUNDARY CONDITIONS
D.1.UY.0.0
D.1.UX.0.0
D.11.UY.0.0
ITER.1.1.1
M.6.UY
M.11.UX
TOTAL.5
AFWRITE
FINISH
/INPUT.27
FINISH
/PREP7
RESUME
KAN.5
KAY.3
C*** INITIAL CONDITIONS AT REST
TIME.0
ACEL..0
LWRITE
TIME.0.3E-3
C*** LOADING STEP 1
ACEL..54096
ITER.20.0.1
LWRITE
C*** LOADING STEP 2
TIME.0.48E-3
ITER.20.0.1
ACEL..23995
LWRITE
C*** LOADING STEP 3
TIME.15.8E-3
ACEL..23995
ITER.100.0.1
LWRITE
C*** LOADING STEP 4
TIME.30.3E-3
ITER.25.0.1
ACEL..0.0
LWRITE
C*** LOADING STEP 5
TIME.0.05
ITER.200.0.1
LWRITE
SLOAD.1
AFWRITE
FINISH
/LNFREQ.5
/INPUT.27
FINISH
/POST26
FILE.10
```

```
DISP.2.6.UY.UY
EXTREM.2
DISP.3.11.UX.UX
EXTREM.3
/GRAPH.LABX.SEC.
/GRAPH.LABY.IN.
/TITLE.5/16" X 19 1/16" POISON SHEET 30° 90 DEG. SIDE DROP DISPLACEMENT
/SHOW.PLOT1..1
PLVAR.2
/SHOW.PLOT2..1
PLVAR.3
FINISH
/STRESS..5
TIME.50E-3
NSTRES.100
END
FINISH
/POST26
ESTR.4.5.11.SB
RFORCE.5.1.FY
RFORCE.6.11.FY
/SHOW.PLOT3..1
/GRAPH.LABY.PSI
/TITLE.5/16" X 19 1/16" POISON SHEET 30° 90 DEG. SIDE DROP BENDING STRESS
PLVAR.4
/GRAPH.LABY.#/IN
/TITLE.5/16" X 19 1/16" POISON SHEET 30° 90 DEG. SIDE DROP END REACTION
/SHOW.PLOT4..1
PLVAR.5.6
FINISH
/OUTPUT
/EOF
```

```
********** ANSYS OUTPUT DATA LISTING **********

 *** ANSYS REV 4.4          38122-PC/LIN-4.4 CP=   12.090 ****
 FOR SUPPORT CALL ROBERT QUINN      PHONE (408) 281-6151    TWX

NEW TITLE= POISON SHEET 30' DROP ANALYSIS 5/16" X 19 1/16" 90 DEG.

VARIABLE  2 IS     6 UY

       SUMMARY OF VARIABLES STORED THIS STEP AND EXTREME VALUES
VARI TYPE  IDENTIFIERS  NAME   MINIMUM    AT TIME     MAXIMUM   AT TIME

  2 DISP     6  UY    6  UY   -0.2763     0.6763E-02 0.1373     0.4043E-01

VARIABLE  3 IS    11 UX

       SUMMARY OF VARIABLES STORED THIS STEP AND EXTREME VALUES
VARI TYPE  IDENTIFIERS  NAME   MINIMUM    AT TIME     MAXIMUM   AT TIME

  3 DISP    11  UX   11  UX   -0.1158E-18 0.7331E-03 0.4873E-19 0.3382E-01

VARIABLE  4  IS ELEMENT     5  ITEM  11  NAME= 5    SB

VARIABLE  5 IS REACTION FORCE     1 FY

VARIABLE  6 IS REACTION FORCE    11 FY

       SUMMARY OF VARIABLES STORED THIS STEP AND EXTREME VALUES
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DENS.1.0.000725
GAMMA.0.02.20
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C*** NODES
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N.11.17.1875.0
FILL
C*** ELEMENTS
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EGEN.10.1.-1
ITER.1.1.1
C*** BOUNDARY CONDITIONS
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M.11.UX
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KAY.3
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 FOR SUPPORT CALL ROBERT QUINN      PHONE (408) 281-6151    TWX

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VARIABLE  3 IS    11 UX

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NUXY,1,0.29
DENS,1,0.000725
GAMMA,0.0,2.20
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C*** NODES
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N,11,19.0625,0
FILL
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KAY,3
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  FOR SUPPORT CALL ROBERT QUINN      PHONE (408) 281-6151    TWX

NEW TITLE= POISON SHEET 30' DROP ANALYSIS 7/16" X 19 1/16" 0 DEG.

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VARIABLE  3 IS    11 UX

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VARIABLE  5 IS REACTION FORCE     1 FY

VARIABLE  6 IS REACTION FORCE    11 FY

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***** ROUTINE COMPLETED ***** CP =       96.230
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A-2.10.4 Oblique Drop Evaluation

The drop orientations for which the IF-300 Channelled BWR Fuel Basket have been analyzed are consistent with those employed in the IF-300 18-Cell BWR Fuel Basket design analysis documented in the Volumes 1 and 2 of this report [A-2.10.1-2]. Specifically, the Channelled BWR Fuel Basket is analyzed for the 0°, 45°, and 90° orientation side drops, and the top and bottom end drops. The hypothetical drop accident conditions specified in 10CFR71 [A-2.10.1-1] §71.73(b)(1) requires evaluation of the drop be performed for the orientation for which maximum damage is expected. This has been interpreted to mean that the evaluation of the basket must include consideration of oblique drop orientations and subsequent slap-down. The purpose of this appendix section is to demonstrate that the drop orientations considered in the analysis of the IF-300 Channelled BWR Fuel Basket are more severe than the oblique drop orientations.

1. Evaluation Approach

The IF-300 cask drop decelerations are evaluated for side drops, corner drops, and oblique drops with subsequent slap-down. The drop deceleration values are developed using the program SCANS [A-2.10.1-18], which uses the cask geometry, weight, and impact limiter stiffness to develop decelerations for the cask under a variety of impact angles for a 30 foot drop.

The cask is analyzed for two side drop orientations, 0° and 180°. The 0° orientation is chosen since the 0° orientation side drop analysis resulted in the highest spacer disk stresses of the three side drop cases evaluated in Section A-2.7. The 180° orientation is also considered since the geometry of the basket for the 180° orientation is identical to the geometry for 0° orientation.

The cask is also analyzed for a variety of oblique drops. For the 180° orientation, an evaluation is performed for angles of 15°, 30°, 45°, 60°, and 75° from horizontal. The 15° through 60° orientations include initial impact and subsequent slap-down; the 75° case is the cask corner drop (i.e. cask center of gravity over corner), and no subsequent slap-down is evaluated.

For the 0° orientation, an oblique drop evaluation is performed for an angle of 15° with subsequent slap-down. This impact and slap-down occurs on the valve box fins on the top side of the IF-300 cask body. At angles of 30° or more, the initial cask

impact will be on the cask end fins. The rotation following the initial impact will result in the valve box fins closest to the initial impact end impacting, followed by continuing cask rotation and impact of the other set of valve box fins. This slap-down sequence results in the rotational energy being removed in two impacts instead of one, and therefore it is expected that the resulting decelerations will be less severe than those for the 180° orientation slap-down. Therefore oblique drops for the 0° cask orientation are not evaluated for angles from 30° to 75°.

2. Development of Impact Limiter Stiffness

The force/displacement data for the impact limiters used in the SCANS program is derived based on the energy absorption capability of the IF-300 impact limiter fins. Due to the unsymmetrical nature of the IF-300 cask impact limiter fins, the derivation of the force/displacement data is required for each cask orientation considered.

Since the depleted uranium shield blocks are located at the top end of the basket assembly, the oblique drop is assumed to occur with initial impact on the bottom of the cask with slap-down on the top end. For the 180° orientation, force-deflection curves are developed for the 0°, 15°, 30°, 45°, 60°, and 75° angles of impact with respect to horizontal for the cask bottom impact fins, and for 0° and 15° for the top impact fins. For the 0° orientation, force-deflection curves are developed for the 0° and 15° angles.

The methodology used to derive the force/displacement relationships is the same as that used in Volumes 1 and 2 of this report [A-2.10.1-2]. A summary of the methodology and the application of the methodology to the development of the force-deflection curves for the IF-300 impact limiter fins are provided in the following sections.

1. Force-Deflection Curve Development Methodology

The force-deflection relationships for the various cask orientations are derived from stress-time relationships developed in the Volumes 1 and 2 of this report [A-2.10.1-2]. Fins inclined less than or equal to 10° from the impact surface ($\tau \leq 10°$) will form a double hinge. All others will form a single hinge ([A-2.10.1-2], p. 5-29). Fins experiencing single hinge bending are assumed

to absorb half the energy of fins in double hinge bending [A-2.10.1-19] and do not experience the peak stresses developed in buckling. The stress in impact limiters experiencing double hinge bending builds to a peak stress of 90 ksi, at which time buckling occurs [A-2.10.1-2]. Following buckling, the impact limiter stress is "governed by the static yield stress" ([A-2.10.1-2], p. V1-15). The static yield stresses for the impact limiter materials are taken as:

304SS: S_y = 40 ksi ([A-2.10.1-2], Figure 5)

216SS: S_y = 50 ksi ([A-2.10.1-20], Type XM-17)

The force time history provided in [A-2.10.1-2] is converted to a force-deflection curve by multiplying the time at which the stressoccurs by the impact velocity. For the 30 foot drop case considered in this analysis, the relative deflection is calculated as:

$$\delta = (V)(t) = (44 \times 12)(t) = 528t \text{ inches}$$

Using this information, the resulting stress-displacement curves for the 304SS and 216SS impact limiter materials are shown in Figures A-2.10.4-1 and A-2.10.4-2, respectively. The forces corresponding to the stresses in Figures A-2.10.4-1 and A-2.10.4-2 are calculated as:

$$F = A\sigma$$

where:

$A = (L_{eff})(t)$

L_{eff} = Effective fin width

= $(L_i + 2L_o)/3$ double hinge bending ([A-2.10.1-2], p. 5-29)

= L_i single hinge bending ([A-2.10.1-2], p. 5-39)

L_o = Outer hinge width

L_i = Inner hinge width

t = fin thickness

σ = stress of the fin material corresponding to deflections (Figures A-2.10.4-1 and A-2.10.4-2).

The hinge lengths, L_o, L_i and L_{eff}, are determined based on the cask orientation and fin geometry associated with each drop case, as described in further detail in the following sections.

2. 180° Cask Orientation (Bottom), Oblique Drops

The oblique drop angles considered in the analysis range from 15° to 75°, in increments of 15°. The cask orientation and end impact limiter geometry are shown in Figures A-2.10.4-3 through A-2.10.4-5. The impact limiter angle with respect to horizontal (i.e. the impact angle) is defined by:

$$\tau = \gamma(\phi/90°)$$

where:

γ = Cask angle with respect to vertical
ϕ = Fin orientation angle, from 0° (impact limiter #1)
τ = Fin impact angle with respect to vertical

The hinge lengths, and consequently, the energy absorption, depend upon the cask orientation and the fin geometry. Based on the impact limiter geometry, the crush deflection, δ_0, assuming a maximum deflection of d - 2t, can be calculated by:

$$\delta_0 = (d)\cos(\phi) - 24.75(1-\cos\phi)\sin\gamma$$

The force deflection data for the bottom and top end impact limiters impacting at oblique angles is derived by summing the forces developed by the individual fins at the respective deflections, at which the fins impact.

3. 180° Cask Orientation, 0° Impact

Since the outer radius of the structural rings extends 1" beyond that of the end impact limiters, the four structural rings and the partial structural ring will impact initially,

and consequently, the first crush increment (δ = 0" to 1.0") will involve only the structural rings. The structural rings are made of 216SS, for which the force-deflection data is derived using the stress-deflection relationship shown in Figure A-2.10.4-2.

For the 0° side drop case, the four structural rings and the partial ring will impact at the same time. Assuming that the load will be distributed equally between all 5 rings, equivalent force-deflection relationships for each end of the cask are calculated assuming the stiffness of the partial ring is distributed equally to each end of the cask. Consequently, the total number of fins per side is assumed to be 2 1/2.

The effective hinge length, L_{eff}, of the structural rings, shown in Figure A-2.10.4-6, for the 0° orientation is:

$L_o = 2(31.75")\sin(\theta_0/2)$

$\theta_0/2 = \cos^{-1}[(31.75-(0.35)(7))/31.75]$
$= 45.3°$

$L_o = 24.46"$

$L_i = 2(31.75")\sin(\theta_1/2)$

$\theta_1/2 = \cos^{-1}[(31.75-7+2(1.25))/31.75]$
$= 61.75°$

$L_i = 32.59"$

$L_{eff} = [2(24.46) + 32.59]/3 = 27.17"$

The total effective cross-sectional area of the structural fins acting at each end is:

$A = 2.5(27.17)(1.25) = 85.0\ in^2$

The force-deflection data for the 0° cask orientation 0° side drop cases are derived using the stress-deflection relationships shown in Figures A-2.10.4-1 and A-2.10.4-2 for the respective fin material types. All crush increments following the initial crush increment include bending of the cask end impact limiters. Therefore the total energy absorbed in bending is the sum of the energy absorbed by the cask end impact limiters, as

described in Section A-2.10.4.1 previously, and the energy absorbed by the structural rings.

In several cases, a 0° secondary impact angle is used in the SCANS analysis. The SCANS analysis results show that, at shallow angles, the cask tends to pivot about a center of rotation near the bottom of the cask. Consequently, all the structural rings will contribute to the energy absorption associated with the secondary impact. The velocity of the secondary impact consists of translational and rotational components. The effective stiffness provided by each fin is assumed to be proportional to its corresponding impact velocity. Assuming the rotational velocity is dominant, the stiffness associated with each structural ring is assumed to be proportional to the moment arm from the point of rotation. Assuming the point of rotation to be located at the bottom end impact limiter, and that the two structural rings near the top of the cask are fully effective, stiffness contributions, K_n, provided by each ring are:

$$K_n = d/L$$

where:

d = distance from cask top to structural ring n

L = distance from cask bottom (rotation point) to center of top end valve box span

K_1	=	26.375/174.1875	=	0.151
K_2	=	42.5/174.1875	=	0.244
K_3	=	104.1875/174.1875	=	0.598
K_4	=	166.125/174.1875	=	0.954
K_5	=	182.25/174.1875	=	1.046
ΣK			=	2.993
			≈	3.0

The results show that the equivalent stiffness, and consequently the resisting force, of approximately three structural rings is provided for the initial crush increment of the secondary impact. Consequently, the force-deflection data for the secondary impact at the cask top end is derived as described previously, assuming the equivalent of three structural rings exist at the cask top end.

If all of the energy is not absorbed in the initial primary and secondary impacts, the bottom end will impact for a second time. Since an equivalent stiffness of three structural rings is used for the secondary impact at the top end, an equivalent stiffness equal to the balance (i.e. 2 structural rings) will be used to develop the force-deflection data for a secondary impact at the cask bottom end.

4. 0° Cask Orientation Impacts

Since the slap-down effects at shallow angles relative to horizontal vary little from larger angles, as shown for the 180° orientation results, and since at angles larger than 15° the end impact limiters will impact initially, only angles of 0° and 15° from horizontal are considered for the geometry associated with the valve box impact limiters for the 0° cask orientation slap-down analysis. At shallow angles ($\tau \leq 15°$), only the impact limiters surrounding the valve boxes are assumed to contact the impact surface. Since the top and bottom valve box impact limiter geometry is identical, the same force-deflection data applies to both ends. To simplify the analysis, the energy absorption data for the valve box impact limiters is applied at the location of the cask end impact limiters. This approach will yield conservative results since the moment arm used in the analysis is larger than the actual moment arms, resulting in conservatively large rotational components of the secondary impact velocity.

The impact limiters surrounding the valve boxes consist of two 1¼" thick structural fins and several smaller fins attached to the valve boxes (Figure A-2.10.4-6). The outer and inner hinge lengths, and consequently the effective hinge length of the structural fins, remain constant for all angles, γ, considered in this analysis. Therefore, the structural fin hinge lengths are:

$L_i = 31.4" + 2(0.35(16")) = 58.0"$

$L_o = 31.4" + 2(16"-2(1.25")) = 42.6"$

$L_{eff} = [2(42.6) + 58.0]/3 = 47.7"$

The hinge lengths of the valve box impact limiters for the angles being considered are given by the equations:

$$L_i = \frac{14.625''}{\sin\gamma}$$

$$L_o = \frac{0.35d}{\sin(90-\gamma)}$$

The maximum possible crush deflection, δ_{max}, of the valve box impact limiter fins, as shown in Figure 2.10.4-7, is:

$$\delta_{max} = X_1 + (7.0" - 2(0.5625"))\sin(\gamma)$$

where:

$$X_1 = Y_1\sin(90-\gamma) = 3.6''\sin(90-\gamma)$$

$$Y_1 = 24.7\tan5° + \frac{3}{16} + \frac{1.25}{\cos5°} = 3.60''$$

The valve box impact limiter fins will impact when the outer structural ring has crushed a distance X_1. The inner structural ring will impact if the crush distance reaches a distance X_2 (Figure A-2.10.4-7) given by the equation:

$$X_2 = Y_2\sin(90-\gamma) = (3.6+14.625+3/16+24.7\tan5°)\sin(90-\gamma)$$

The angle of the valve box impact limiter fins with respect to the impact surface, τ, is given by:

$$\tau = \phi(\gamma/90)$$

The angle of the inner and outer structural rings, τ_{SRI} and τ_{SRO}, with respect to the impact surface are:

$$\tau_{SRI} = |85° - \gamma|$$

$$\tau_{SRO} = |95° - \gamma|$$

Those fins for which the angle τ is less than 10°, are assumed to experience double hinge bending. Those fins for which τ is greater than 10° are assumed to experience single hinge bending.

The valve box impact limiters and structural rings are made of 216SS. Therefore, the force-deflection data are derived using the stress-deflection relationship given in Figure A-2.10.4-2. The resulting force-deflection data used in the SCANS [A-2.10.1-18] program for the 0° cask orientation 0° and 15° impact angles are shown in Figures A-2.10.4-8 and A-2.10.4-9.

3. Oblique Drop Evaluation Results

The resulting maximum decelerations for the side and oblique drops evaluated, accounting for slap-down effects, are reported in Table A-2.10.4-1. The results show that the 0° cask orientation side impact (0° angle with respect to the horizontal) load case imparts the highest deceleration loading to the IF-300 basket assembly, consistent with the basis for the analysis in Section A-2.7. The maximum slap-down decelerations are significantly less than those for the straight side drop. Therefore it is concluded that the side drop decelerations represent a bounding loading condition for the oblique drop slap-down loads, and therefore the basket need not be evaluated for slap-down loads.

Table A-2.10.4-1

Maximum Deceleration Loading

CASK ORIENTATION	IMPACT ANGLE WITH RESPECT TO HORIZONTAL	MAXIMUM DECELERATIONS (in/sec²)	
		BOTTOM END (PRIMARY IMPACT)	TOP END (SECONDARY IMPACT)
180° (BOTTOM IMPACT)	0°	114.8	114.8
	15°	50.0	67.1
	30°	26.9	67.4
	45°	33.0	67.4
	60°	46.4	32.8
	75°	81.6	N/A
0° (TOP IMPACT)	0°	211.5	211.5
	15°	124.4	124.4

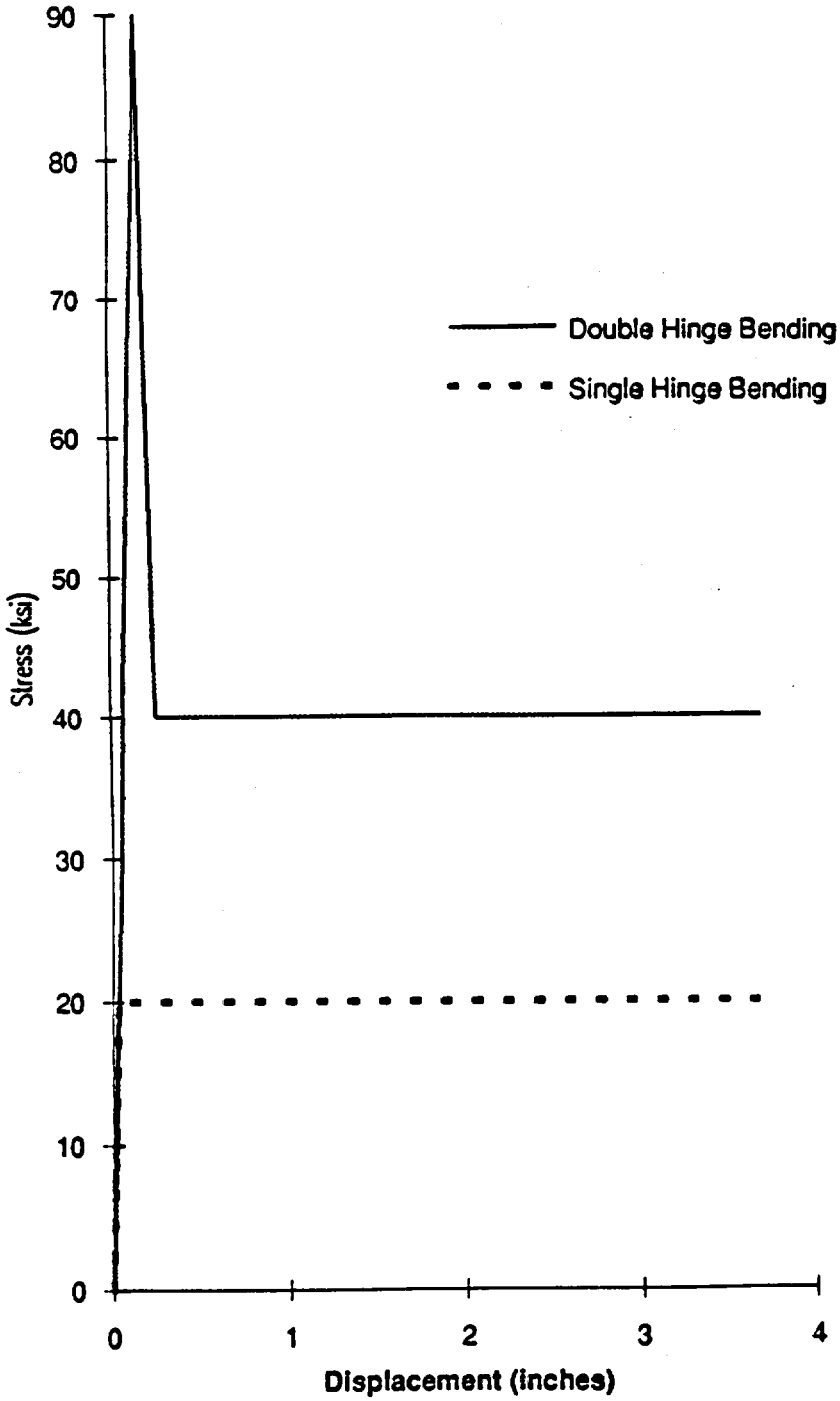

Figure A-2.10.4-1

Stress-Deflection Relationship for 304SS Impact Limiters

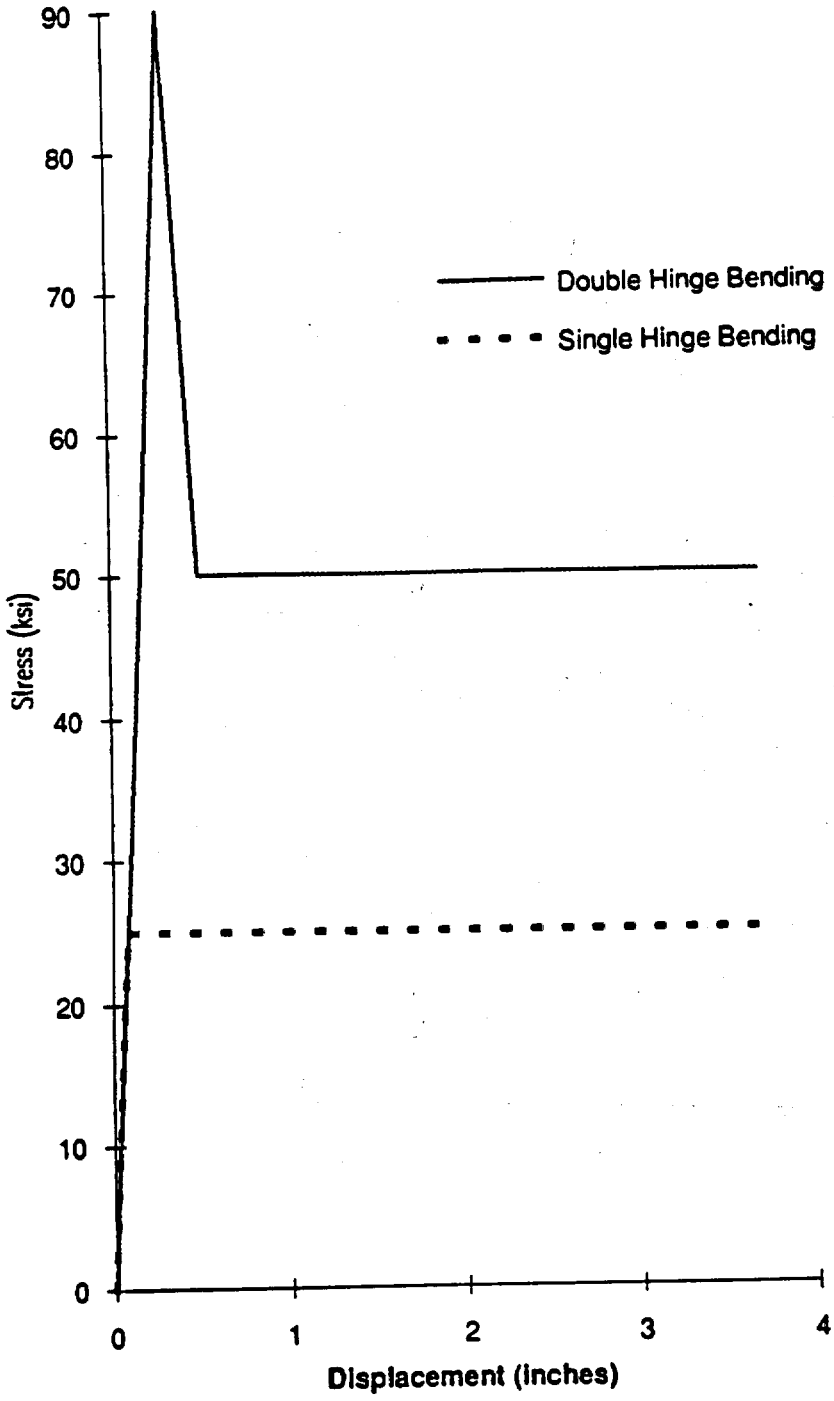

Figure A-2.10.4-2

Stress-Deflection Relationship for 216SS Impact Limiters

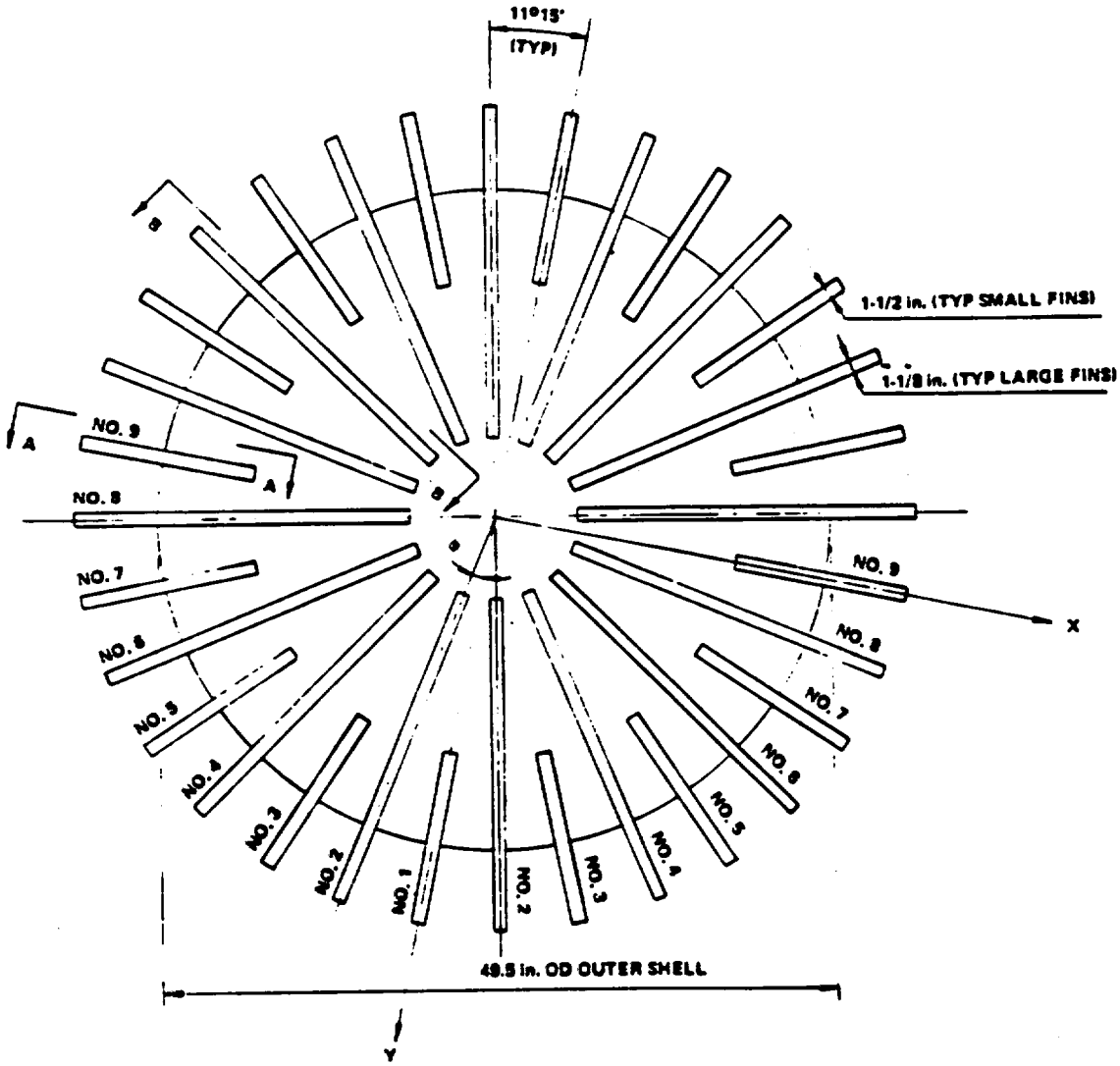

Figure V4-2.10.4-3

End Impact Limiter Orientations

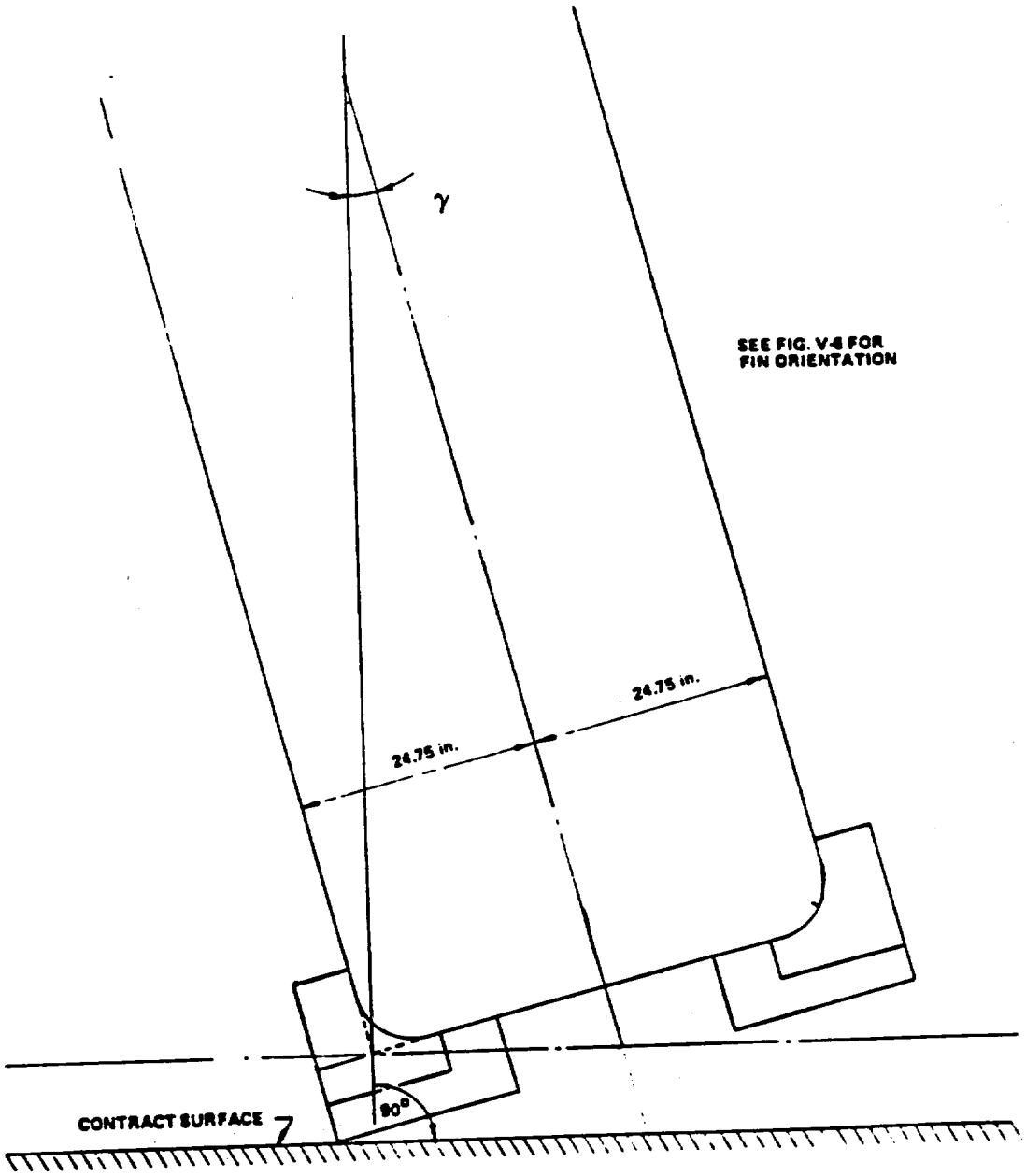

Figure A-2.10.4-4

Cask Orientation for Oblique Drops

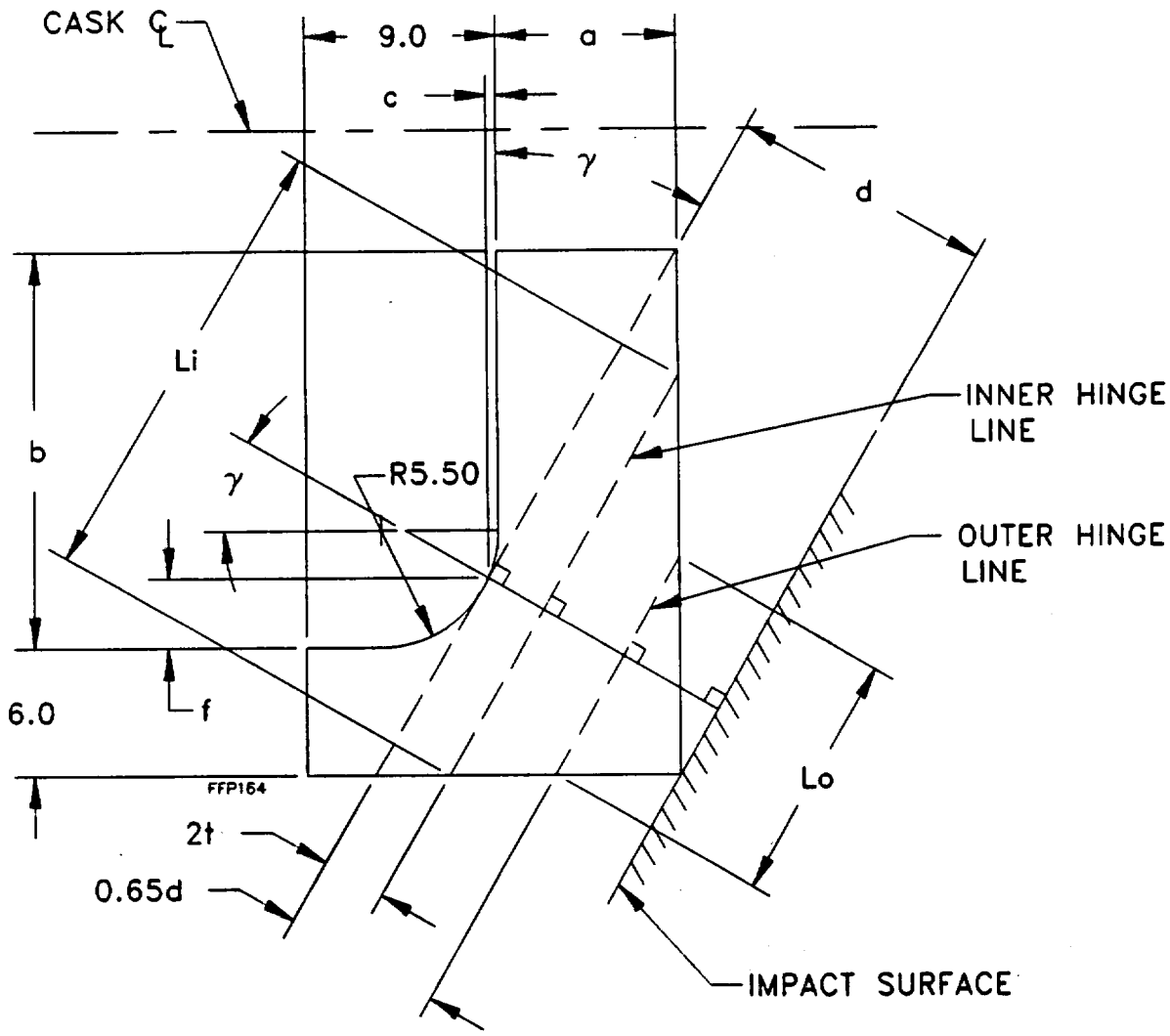

Figure A-2.10.4-5

End Impact Limiter Geometry

FIGURE WITHHELD UNDER 10 CFR 2.390

Figure A-2.10.4-6

Valve Box Impact Limiter Geometry

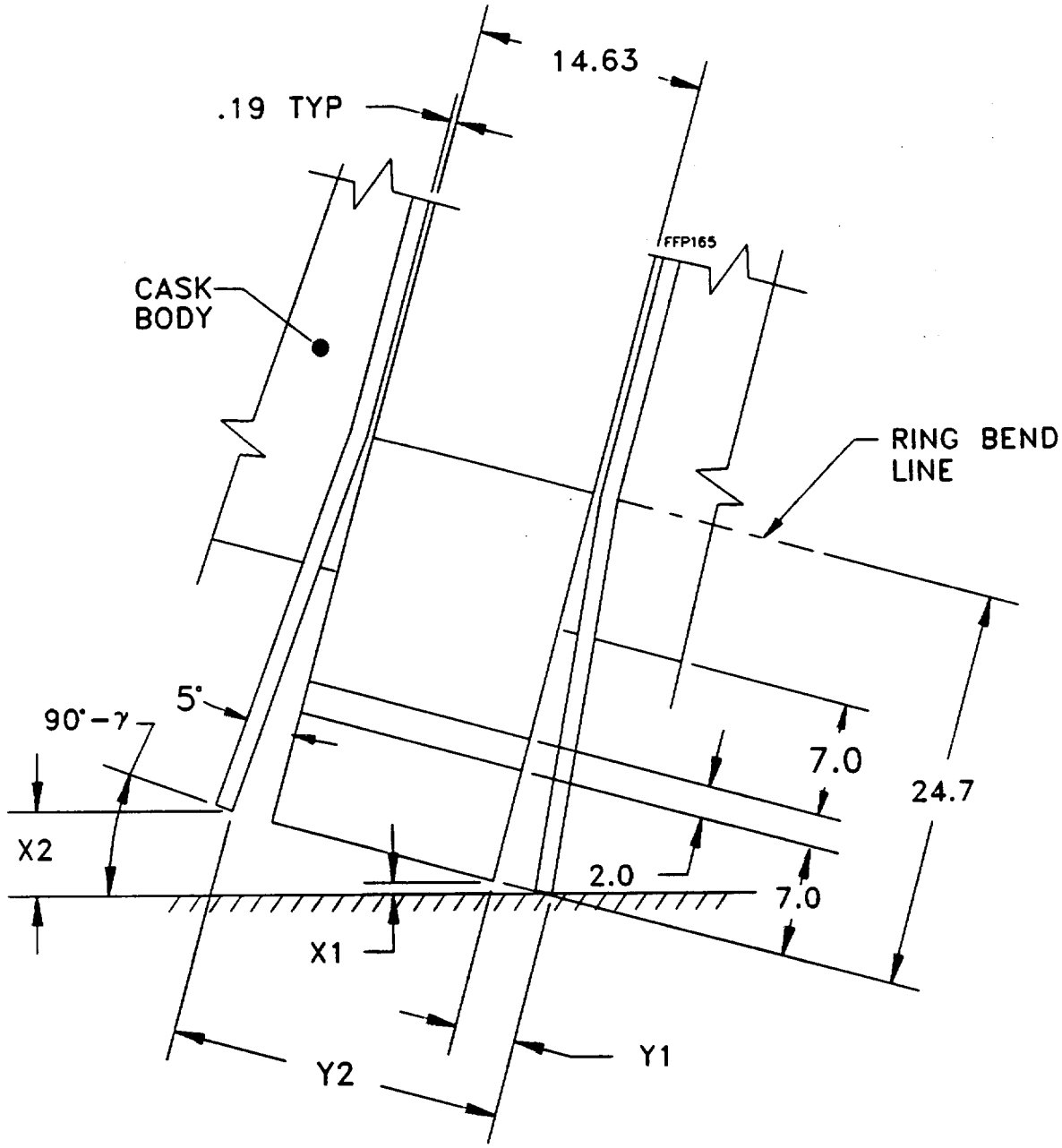

Figure A-2.10.4-7

Valve Box Orientation for Oblique Drop

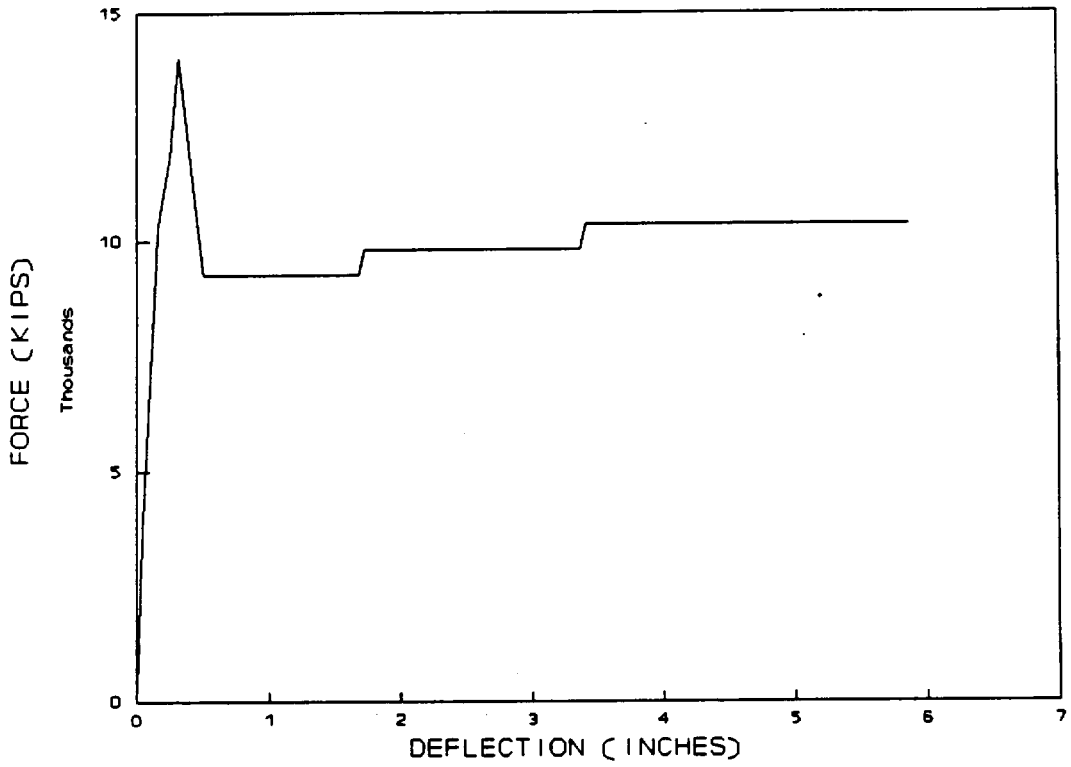

Figure A-2.10.4-8

Force-Deflection Data, Top and Bottom Impact Limiters 0° Cask Angle wrt Horizontal, 0° Cask Orientation

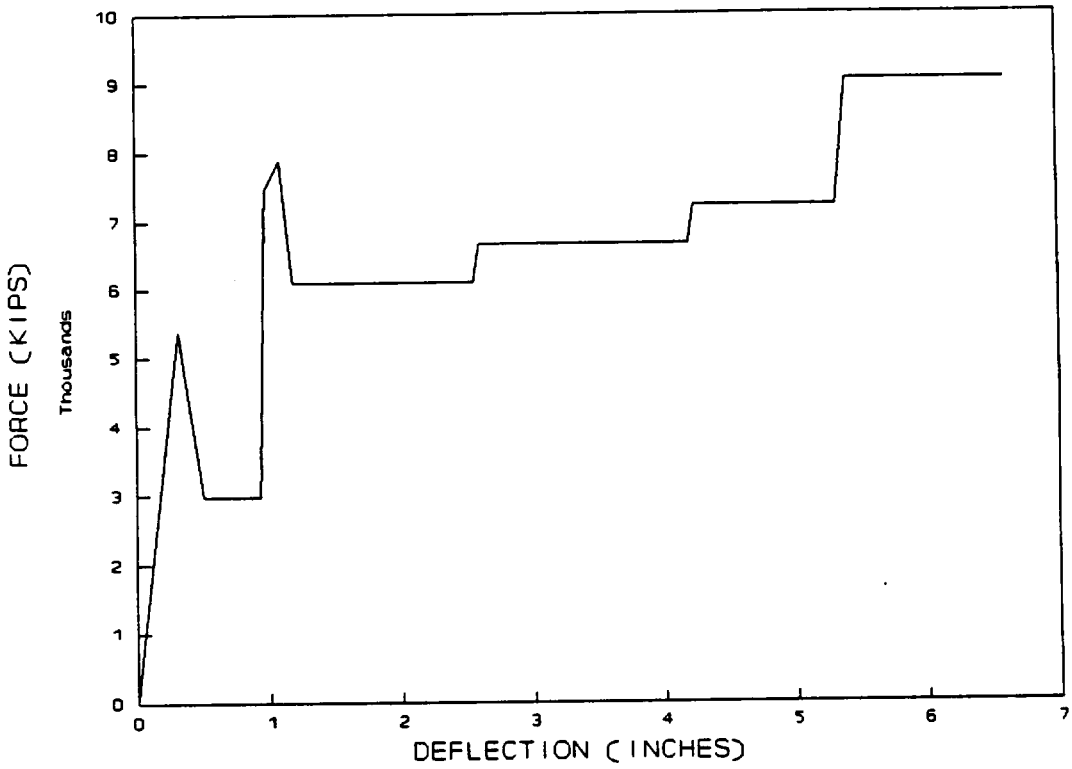

Figure A-2.10.4-9

Force-Deflection Data, Top and Bottom Impact Limiters
15° Cask Angle wrt Horizontal, 0° Cask Orientation

A-3.0 THERMAL EVALUATION

The thermal analyses of the IF-300 shipping cask with the Channelled BWR Fuel Basket is described in this chapter. The Channelled BWR Fuel Basket contains 17 BWR fuel assemblies. The design basis fuel assemblies have a maximum burnup of 35,000 MWD/MTIHM and a total design basis heat load of 40,000 Btu/hr [A-3.6.1-1]. This corresponds to a maximum decay heat rate of 2,353 Btu/hr per fuel assembly.

The controlling thermal analyses presented in this report assume that the IF-300 Cask is used in the "dry" shipping mode [A-3.6.1-1]. The thermal analyses are not based on specific fuels but rather on an enveloping "design basis" configuration that results in an analyzed upper limit on the cask thermal capacity. The cask is intended as a general purpose packaging and, as long as the design basis conditions are not exceeded, will function adequately and safely for any BWR fuel that may be placed in the cavity fuel baskets. As discussed in Chapter A-1.0, the IF-300 Cask body is unaffected by the use of the Channelled BWR Fuel Basket. The purpose of the thermal analyses presented herein is to demonstrate that the IF-300 Cask with the Channelled BWR Fuel Basket provides suitable heat dissipation to maintain the heat removal capacity of the loaded IF-300 Cask.

A-3.1 Discussion

The principal design features and operating characteristics of the IF-300 Cask with the Channelled BWR Fuel Basket are the same as with the 18-Cell BWR Fuel Basket [A-3.6.1-2]. The operations of all the subsystems (i.e., expansion tanks for liquid neutron shield and others) are not affected by the Channelled BWR Fuel Basket.

A-3.1.1 Thermal Design Criteria

The maximum fuel cladding temperature criteria for the design basis BWR fuel is 1200°F which provides sufficient margin to ensure that cladding failure by creep rupture will not occur for all design basis conditions. This 1200°F temperature limit is based on the data presented in Figure A-3.1-1 [A-3.6.1-2]. The minimum cask cavity relief pressure is 350 psig and the design pressure of the IF-300 Cask is 400 psig [A-3.6.1-2]. In addition, the IF-300 Cask neutron shielding cavity is provided with a 200 psig pressure relief valve to provide overpressure protection [A-3.6.1-2]. A minimum cooling time of 3 years is assumed with 35,000 MWD/MTIHM burnup in the analysis to determine the bounding radiological and thermal source strengths in the cask cavity. A maximum

design basis heat load of 40,000 Btu/hr is conservatively used in the thermal analyses. The resulting maximum decay heat rate for the BWR fuel is 2,353 Btu/hr per fuel assembly. To prevent freezing of the neutron shielding water, an antifreeze solution of ethylene glycol, or equivalent, is added to form a 50/50 volume percent mixture for cask operations as low as -40°F ambient. Hence, there is no requirement for minimum heat load in the cask cavity.

A-3.1.2 Design Basis Conditions

Four enveloping conditions of operation are evaluated. The characteristic features of each of these conditions are summarized in Table A-3.1-1. All of the analyses presented are for a total decay heat load of 40,000 Btu/hr and dry shipments with an inert cover gas.

A-3.1.3 Results of Design Basis Thermal Analyses

The analytical results obtained from evaluating the design basis conditions are summarized in Table A-3.1-2. They are based on the use of the thermal analysis modules HTAS1 [A-3.6.1-3] and HEATING6 [A-3.6.1-4] in the SCALE computer program system [A-3.6.1-5] to obtain cask and fuel rod cladding temperature distributions.

Table A-3.1-1

Enveloping Design Basis Thermal Conditions
Operating Condition

Parameter	NOC[1]	30-Minute Fire	3-Hour Post Fire	PFE[2]
Neutron Shielding Cavity Contents	Water	Air	Air	Air
Solar Heat Load	No(3)	No(4)	Yes	Yes
Ambient Temp., °F	130	1,475	130	130

Notes:

1. Normal operating condition.
2. Post fire equilibrium.
3. Cask enclosure in place.
4. Not significant during fire transient.

Table A-3.1-2

Design Basis Thermal Analysis Results

Parameter	NOC	30-Minute Fire	3-Hour Post Fire	PFE
Ambient Temp., °F	130	1,475	130	130
Cavity Heat Load, Btu/hr	40,000	40,000	40,000	40,000
Max. Barrel Centerline Temp., °F	194	1,281	249	215
Max. Outer Shell Centerline Temp., °F	199	497	397	319
Max. Inner Cavity Centerline Surface Temp., °F	207	340	407	327
Max. Cladding Temp., °F	685	<769	769	<769
Maximum Inner Cavity Pressure, psig	30.4	<242	242	<242
Maximum Inner Cavity Pressure with All Fuel Rods Rupture, psig	76	295	295	295

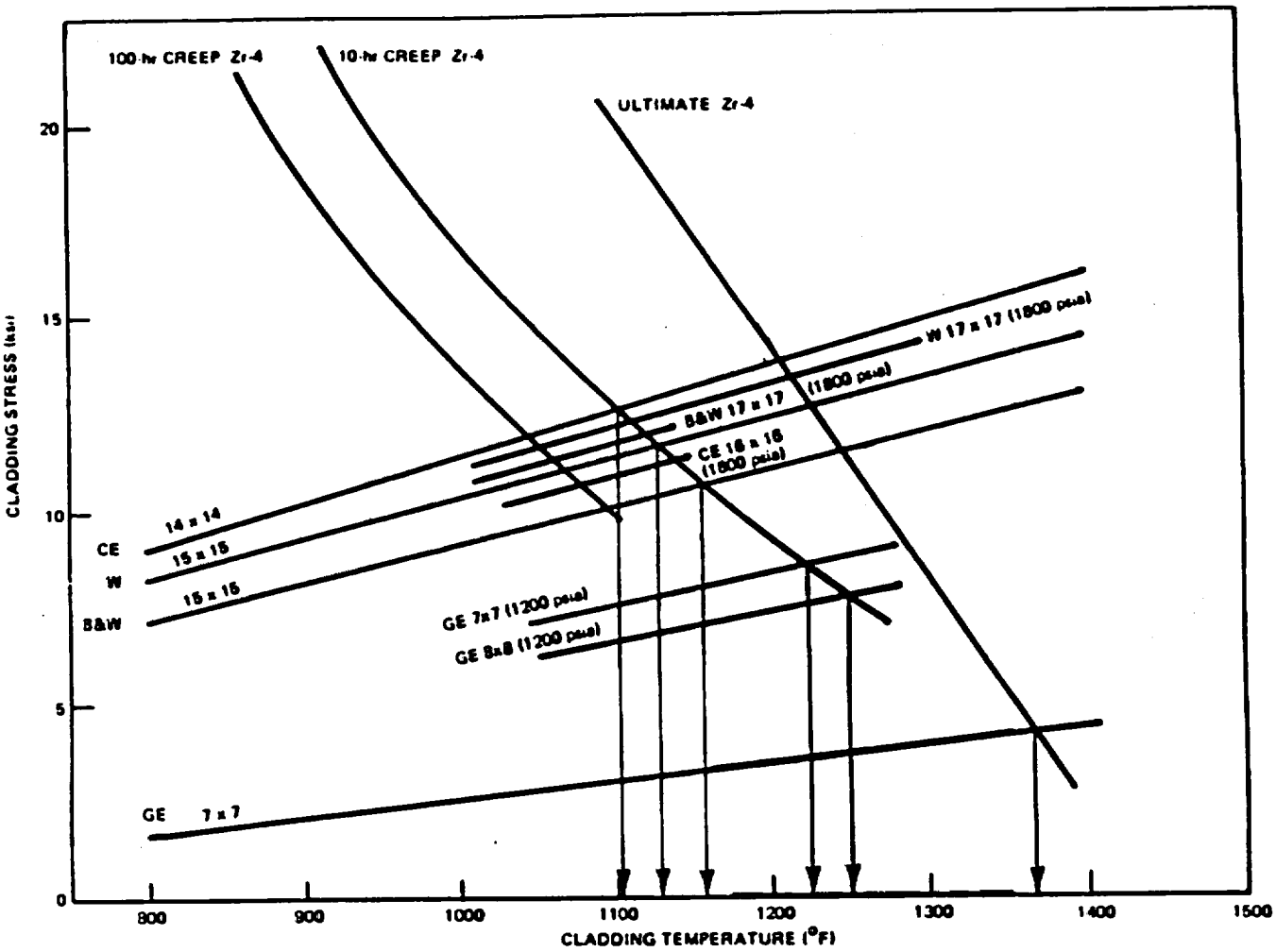

Figure A-3.1-1

Zircaloy Cladding Perforation Temperatures
[A-3.6.1-2]

A-3.2 Summary of Thermal Properties of Materials

The thermal properties of the IF-300 Cask materials used in the HTAS1/HEATING6 modules of the SCALE computer program system are summarized herein. HTAS1 has a built-in library of material properties for various cask materials. The material properties of IF-300 Cask materials are given in Volumes 1 and 2 [A-3.6.1-2]. The material properties given in Volumes 1 and 2 and HTAS1 are compared and in all significant cases bounding values are used in the thermal analyses. Of primary importance to thermal analyses are the four material and surface properties:

K = thermal conductivity (Btu/hr-ft-°F)
ρ = density (lbm/ft^3)
C = specific heat (Btu/lbm-°F)
ϵ = surface emissivity

Values of the cask material properties K, ρ, and C are given in Table A-3.2-1 and the values of surface emissivity are given in Table A-3.2-2.

Table A-3.2-1

Material Property Summary

Material Name	Density (lb/ft^3)	Trans. Temp. (°F)	Conductivity Temp (°F)	Conductivity (Btu/ hr-ft°F)	Specific Heat Temp (°F)	Specific Heat (Btu/ lb°F)	Refs.[7]
DURANIUM[1]	1190	2070	100	14.3	32	0.0275	2,3
			300	15.9	662	0.035	
			500	17.4	1225	0.048	
			800	19.6			
			1200	22.5			
SST304	491	2552	32	8.1	32	0.12	3
			212	8.7	752	0.135	
			392	8.7			
			572	9.4			
			752	10.0			
			1112	11.0			
			1472	13.0			
XM-19	(4)	2552	100	8.7	(4)	(4)	6
			200	9.3			
			300	9.8			
			400	10.4			
			500	10.9			
			600	11.3			
			700	11.8			
			800	12.2			
			900	12.7			
H2OCONV[2]	60	(6)	150	14.75	32	1.0072	3
			200	17.33	68	0.9986	
			250	19.15	104	0.9978	
			300	20.83	140	0.9992	
			400	23.35	176	1.0021	
					212	1.0068	
					248	1.0149	
					284	1.0228	
					320	1.0369	
					356	1.0548	
					392	1.0758	
					428	1.1009	
					464	1.1357	
					500	1.1818	
					537	1.2437	
					572	1.3678	

Table A-3.2-1

Material Property Summary
(Concluded)

Material Name	Density (lb/ft³)	Trans. Temp. (°F)	Conductivity Temp (°F)	Conductivity (Btu/hr-ft°F)	Specific Heat Temp (°F)	Specific Heat (Btu/lb°F)	Refs.[7]
AIRCONV[3]	0.059	(6)	(5)	0.1	-6.67	0.24007	3
					83.33	0.24016	
					173.33	0.24095	
					263.33	0.24214	
					353.33	0.24374	
					443.33	0.24584	
					533.33	0.24816	
					623.33	0.25196	
					713.33	0.25396	
					803.33	0.25676	
					893.33	0.25924	
					983.33	0.26215	
					1073.33	0.26495	
					1163.33	0.26774	
					1253.33	0.27035	
					1343.33	0.27264	
					1523.33	0.27701	
ZIRCALOY	(4)	3350	100	6.82	(4)	(4)	7,13
			200	6.89			
			400	7.11			
			600	7.37			
			800	7.64			
ARGON	(4)	(6)	100	0.0105	(4)	(4)	8
			200	0.0120			
			300	0.0134			
			400	0.0148			
			500	0.0160			
			1,000	0.0215			
FUEL	See Section A-3.4.1.2.2						

Notes:

1. Depleted Uranium.
2. Water with effective thermal conductivity simulating natural convection.
3. Air with effective thermal conductivity simulating natural convection.
4. Not needed for steady state analysis.
5. Assumed constant.
6. Not applicable.
7. References are A-3.6.1-X, where X = number in this column.

Table A-3.2-2

Emissivity Parameters

Emitter

Condition	Linkage	Emissivity[1]	Ref.	Geometric View Factor	Receptor Absorptivity
Normal (Pre-Fire)	End-to-Ambient	0.84	2	1.0	1.0
	Side-to-Skid/ Ducts	0.83	2	0.55	0.25
	Side-to-Ambient	0.83	2	0.45	1.0
Fire	Ambient-to-All	0.90 (1,475°F)	9	1.0	0.83
Post-Fire and Final	End-to-Ambient	0.83	2	1.0	1.0
	Side-to-Ambient	0.83	2	1.0	1.0
All	Stainless Steel-to-Zircaloy	0.312	10,11	1.0	1.0
	Stainless Steel-to-Ambient	0.587	10	1.0	1.0
	Stainless Steel-to-Stainless Steel	0.415	10	1.0	1.0
	Zircaloy-to-Zircaloy	0.25	11	1.0	1.0
	Zircaloy-to-Ambient	0.40	11	1.0	1.0

Note:

1. Real or effective emissivity.

A-3.3 Technical Specifications of Components

Channelled BWR Fuel Basket contains Type 304, and XM-19 stainless steel, and ASTM A-887 borated stainless steel with transition temperature of 2552°F [A-3.6.1-3]. The Channelled BWR Fuel Basket also contains depleted uranium with transition temperature of 2070°F. The maximum fuel rod temperature criteria for the General Electric BWR fuel is 1200°F [A-3.6.1-2]. The temperatures resulting from 10CFR71 [A-3.6.1-9] normal and accident conditions fall well within the above temperature limits.

The technical specifications of the IF-300 Cask components [A-3.6.1-1 & 2] are not affected by the Channelled BWR Fuel Basket.

A-3.4 Thermal Evaluation for Normal Conditions of Transport

This section presents the thermal analyses of the IF-300 Cask with Channelled BWR Fuel Basket for the enveloping normal conditions of transport. The thermal conditions considered are those specified in 10CFR71, Section 71 [A-3.6.1-9], except that a conservative value of 130°F ambient temperature is used instead of the required value of 100°F. The cask is mounted on the skid in its normal position (horizontal orientation) with natural convection heat transfer on the cask surface. When transported on its skid, the IF-300 Cask is shielded from direct solar heat gain by its retractable enclosure [A-3.6.1-2]. Therefore, the solar insolation during normal conditions of transport need not be included in the analysis.

The inner cask cavity is gas-filled and the neutron shielding cavity is water filled. Heat dissipation is by convection and radiation from the fuel to the cavity walls, conduction through the cask body, convection across the neutron shielding containment, and a combination of natural convection and radiation from the cask exterior to the environment and the skid. The analytical models used in thermal evaluation during normal conditions of transport are described in Section A-3.4.1.

A-3.4.1 Thermal Models

Two thermal models are utilized to perform the thermal analyses of the IF-300 Cask with Channelled BWR Fuel Basket. The first model uses control module Heat Transfer Analysis Sequence Number One (HTAS1) [A-3.6.1-3] and functional module Heat Engineering and Transfer in Nine Geometries (HEATING6) [A-3.6.1-4] in the Standardized Computer Analyses for Licensing Evaluation (SCALE) computer program system [A-3.6.1-5] to calculate the temperature distribution in the IF-300 Cask body

layers for the operating conditions listed in Table A-3.1-1. The second model uses module HEATING6 and the results of the first model as boundary conditions to calculate the detailed temperature distribution in the Channelled BWR Fuel Basket components and the maximum fuel rod cladding temperature.

1. Cask Analytical Model Using HTAS1

The HTAS1 control module was developed for the United States Nuclear Regulatory Commission to perform standardized thermal analyses on a class of nuclear fuel shipping containers which can be modelled by a combination of homogenous, right circular cylinders. HTAS1, a control module in the SCALE package, uses the HEATING6 functional module to perform the prescribed thermal analysis. The nuclear fuel shipping container must be composed of acceptable combinations of zones consisting of cask inner cavity, an inner shell, gamma shielding, an outer shell, a neutron shield, a water jacket, and impact limiters. Thermal properties for the materials in each zone may be extracted from a material property library supplied with the code or may be supplied by the user. The desired thermal analysis of the nuclear fuel shipping container is defined by an analytical sequence composed of one or more of the following calculations chosen in an acceptable order: an initial steady state; a prefire steady state; a fire transient; a post-fire transient; and a final steady state. Each calculation in an analytical sequence specifies the type (steady state or transient), the ambient temperature, the duration of any transient, and the heat transfer mechanisms at the surface of the model. Selected portions of the model (e.g., impact limiters, water in neutron shield during accident) may be deleted at certain points in an analytical sequence to simulate changes in the nuclear fuel shipping container during an analysis. The model and analytical sequence are described to HTAS1 using free-form, keyword-oriented data making extensive use of defaults. The default values are chosen to match those specified by 10CFR71. HTAS1 generates the HEATING6 input data necessary to model each calculation in an analytical sequence and transfers control to the SCALE driver which accesses the HEATING6 functional module to perform the desired analysis. It uses the final temperature distribution from the previous HEATING6 thermal analysis as an initial temperature distribution for the current thermal analysis.

The keywords for the zones of the HTAS1 analytical model of the IF-300 Cask with the Channelled BWR Fuel Basket are shown in Table A-3.4-1. The HTAS1 model of the IF-300 Cask during normal conditions of transport is shown in Figure A-3.4-1. The cask dimensions used in this analysis are the same as those specified in the existing IF-300 Cask Certificate of Compliance [A-3.6.1-1]. The analytical model consists of zones designated as CAVITY, INNER SHELL, SHIELDING, OUTER SHELL, NEUTRON SHIELD, and WATER JACKET as the cask zones.

The CAVITY zone in the model is the cask inner cavity with a heat load of 40,000 Btu/hr under the "DRY" shipping condition [A-3.6.1-1]. The INNER SHELL zone in the model is the cask inner shell modelled as Type 304 stainless steel. The SHIELDING zone is the gamma shielding of IF-300 Cask modelled as depleted uranium. The OUTER SHELL zone in the model is the cask outer shell modelled as Type 304 stainless steel. The NEUTRON SHIELD zone is the neutron shield modelled as water. The WATER JACKET zone is the corrugated metal jacket enclosing the neutron shield modelled as Type 304 stainless steel.

As discussed in the preceding paragraph, the cask inner and outer shell are modelled as Type 304 stainless steel. The cask inner and outer shell are actually fabricated of Types 317 and 216 stainless steel. The difference in thermal properties of the modelled material and the actual material are minimal (less than 2%). Therefore use of the Type 304 stainless steel to model the inner and outer shell is adequate.

The IF-300 cask neutron shield is filled either with water or a 50/50 mix of water and ethylene glycol. The analytical model uses the properties of water for the neutron shield. As discussed in the CSAR [A-3.6.1-2], the difference in thermal distributions between water and a 50/50 water/ethylene glycol mixture is negligible under the dry shipping condition. Therefore the use of the properties of water for the neutron shield is appropriate.

The analytical sequence utilized in HTAS1 for the thermal evaluation for the normal conditions of transport is the PREFIRE case. The thermal analysis of the IF-300 Cask is performed for the design basis normal operating condition described in Section A-3.4, which is the same as PREFIRE case in HTAS1.

The thermal properties of materials utilized in the HTAS1 analytical model zones are taken from Tables A-3.2-1 and A-3.2-2. To account for natural convection from the corrugated surface of the water jacket to the ambient during the PREFIRE case, the following approach is used:

Convection from the corrugated surface of the water jacket cannot be adequately modelled as a fin due to the lack of a radial temperature gradient across the corrugated surface. Therefore the natural convection heat flow as modelled by HTAS1 is given by the correlation:

$$Q_n = h_n (T_s - T_a)^{h_e} A (T_s - T_a)$$

where h_n and h_e are the natural convection coefficient and exponent respectively, A is the surface area, and T_s and T_a are the surface and ambient temperatures. The surface area of the corrugated water jacket is much larger than that of a similar cylinder ($2\pi rL$). The actual surface area of the corrugated water jacket is equal to a constant times that of a cylinder of similar dimensions.

The constant by which h_n is multiplied to account for a corrugated surface is equal to the ratio of the actual length of one period of the corrugation to the axial length. The cask dimensions utilized are taken from Volumes 1 and 2 [A-3.6.1-2]. The axial length of one period is 2.50 inches. The length of one corrugation is equal to twice the straight length plus 360 degrees of the curved portion. The inside radius of the bend is 0.56 inches, and the jacket is .125 inches thick. The average radius is then .56 + .125/2 or .6225 inches. The length of the straight portion is .5625 inches. The overall length is then $2\pi(.6225) + 2(.5625) = 5.036$ inches. The value of h_n used in HTAS1 is 0.18. The resulting value of h_n used in the analysis to account for convection from corrugated surface is then:

$$0.18(5.036/2.5) = 0.363 \text{ Btu/hr-ft}^2\text{-}^\circ\text{F}.$$

The geometric view factor from the side of the cask to the skid is 0.55 and the view factor to ambient is 0.45 (Table A-3.2-2). The receptor absorptivity for the skid is 0.25 and for the ambient is 1.0 (Table A-3.2-2). The side emissivity including the corrugated surface is 0.83 (Table A-3.2-2). The

resulting emissivity from the water jacket during the PREFIRE case (when the cask is on the skid) is then:

$$\epsilon = 0.83\ [(0.55)(0.25) + 0.45] = 0.488$$

The IF-300 Cask has fins on the top and bottom cask surfaces. These axial fins are modelled as follows:

The fin geometries on the top and bottom axial surfaces of the IF-300 Cask do not correspond exactly to that of the HTAS1 fin library. The surface area of the fins was calculated in Table A-3.4-2 and an equivalent area was used for a similar fin geometry from the HTAS1 fin library. The fin type used is the straight rectangular cross section fin. The total surface area of the top and bottom fins is 29,694 sq. inches. Therefore, the surface area of the fins used in the analytical model is 14,847 sq. inches at each end.

The fins in HTAS1 are assumed to run the length of the outer shell surface at the end of the cask. The average length of a fin is $2(4\pi r/3)$ or 21.01 inches. The thickness of the fins used in the analytical model is 1.125 inches. The center-to-center spacing of the fins is assumed to be 1.5 inches. The equivalent height of the fin required for the surface area of 14,847 in^2 is then 9.63 inches.

The following assumptions are used in the cask thermal analysis:

A. Material thermal conductivities are varied linearly with temperature per Table A-3.2-1.

B. Surface emittance and absorptance values are held constant per Table A-3.2-2.

C. The cask is assumed to be horizontal during all analytical sequences.

D. Thermal radiation between adjacent parallel cask surfaces characterized as infinite parallel surfaces according to the following correlation [A-3.6.1-8]:

$$\epsilon_{effective} = \frac{1}{[(1/\epsilon_1) + (1/\epsilon_2) - 1]}$$

The input file prepared for the HTAS1 model of the PREFIRE case is listed in Section A-3.6.3. A steady state temperature distribution for the cask was achieved after 12 iterations. The HTAS1 results of this final iteration is also included in Section A-3.6.3.

2. Basket Analytical Model Using HEATING6

The purpose of this analytical model is to perform the thermal analysis of the IF-300 Cask with the Channelled BWR Fuel Basket. The parameters calculated include the peak fuel rod cladding temperature, the spacer disk temperature distribution and the average cask cavity cover gas temperature. These parameters are calculated for the normal conditions of transport described in Section A-3.4.1.

The computer code HEATING6 [A-3.6.1-4] is used to discretely model the IF-300 Channelled BWR Fuel Basket. HEATING6 solves steady-state and/or transient heat conduction problems in one, two, or three dimensional Cartesian or cylindrical coordinates; and is a functional module within the SCALE computer program system [A-3.6.1-5] for performing thermal analyses on problems arising in licensing evaluations of spent fuel shipping casks. The thermal conductivity, density, and specific heat may be both spatially and temperature dependent. The heat generation rates may be dependent on time and position. Boundary conditions which may be applied along surfaces of an analytical model include specified temperatures or any combination of prescribed heat flux, forced convection, natural convection, and thermal radiation. Models are also available to simulate the thermal fin efficiency of certain finned surfaces. In addition, the user may specify radiative heat transfer across gaps or regions which may be embedded in the model. The boundary condition parameters may be time- and/or temperature-dependent. The mesh spacing may be variable along each axis. The input/output features of HEATING6 were designed to be compatible with that of the other functional modules within the SCALE computer program system. HEATING6 may also be used as a stand-alone, heat transfer analysis code. The cask temperatures used as input (applied as constant temperature boundary condition) in this analysis were obtained using the control module HTAS1 within the SCALE computer program system as documented in Section A-3.4.1.1.

The cask is assumed to be in the horizontal position, with the channelled fuel assemblies resting on the fuel cell openings in the basket spacer disks. To determine the peak fuel rod clad temperature for each case, the HEATING6 code is run with an argon fill gas in the cask, and effective thermal conductivity of the fuel as described in Section A-3.4.1.2.2. Helium, nitrogen, and argon are allowed by the IF-300 Cask Certificate of Compliance [A-3.6.1-1]. Argon has the lowest thermal conductivity as compared to helium and nitrogen. The maximum fuel rod cladding temperatures and temperature distribution in the basket components calculated using argon as the cask cavity cover gas is bounding for helium and nitrogen as the fill gases. The average cask cavity cover gas temperature is calculated by area weighted averaging of the gas temperatures given in the HEATING6 output.

The heat generated in the fuel region was assumed to be transferred to the fuel assembly channel walls by conduction, convection and radiation using the effective fuel thermal conductivity. Heat is transferred through the channels by conduction and radiation only. Any convection heat transfer due to cover gas between the fuel assembly channels and the cask inner cavity is conservatively neglected.

The spacer disk temperature distribution, which is used to determine thermal stresses in the spacer disks and basket, is calculated by replacing the cover gas regions in the analytical model with stainless steel. The key parameter in calculating the thermal stresses is the temperature gradient across the spacer disk. Due to the higher thermal conductivity of steel, the gradients in the cask for the cover gas regions replaced with steel case are smaller than that of the cover gas filled cask. Because the spacer disks are actually bounded by the cover gas on both sides, the actual gradients are greater than that calculated by replacing the cover gas with stainless steel. Therefore, to determine the temperature distribution in the spacer disks, the results of the argon filled and cover gas replaced by steel cases are averaged. This method provides a conservative temperature gradient across spacer disks for the purpose of calculating enveloping thermal stresses.

2. Description of HEATING6 Model of Basket

The input parameters utilized in the HEATING6 analytical model of the Channelled BWR Fuel

Basket are discussed herein. Input listings of the initial runs for the argon filled and argon replaced by steel during loss of mechanical cooling (LOMC) conditions are given in Section A-3.6.2. LOMC case is the same as the normal conditions of transport case described in Section A-3.4. The terminology LOMC is a carryover from earlier work [A-3.6.1-1 & 2], and is used for consistency with the CSAR [A-3.6.1-2] terminology.

The HEATING6 model of the IF-300 Channelled BWR Fuel Basket is shown in Figure A-3.4-2. Because of symmetry, the basket is modelled as a half cylinder. Regions 1 through 11 represent the fuel assemblies, assumed to be homogenized over the insides of the channels using appropriate heat transfer correlations as discussed in Section A-3.4.1.2.2. Regions 14 and 15 represent the neutron poison panels. The edges of the neutron poison panels have been shortened slightly to coincide with the fuel channels to reduce the computer core required by the HEATING6 code while producing conservative results. In addition, the narrow (6.25 and 6.5 inch wide) neutron poison panels are not included in the HEATING6 model of the Channelled BWR Fuel Basket, and are replaced in the model by the cavity cover gas regions. This methodology is conservative for calculating the temperature distribution in the basket components and the maximum fuel rod cladding temperature. The argon cover gas has substantially lower thermal conductivity as compared to the poison panels, resulting in higher resistance to the heat flow out of the fuel regions and increasing the temperature of fuel regions. Regions 16 through 54 represent the Zircaloy channels around the homogenized fuel regions. Regions 101 through 112 represent the outer cavity cover gas regions. Regions 201 through 223 represent the inner cavity cover gas regions, and Regions 301 through 311 represent the cask inner liner.

The outside radius of the cask inner liner is 19.25 inches [A-3.6.1-2], which corresponds to a perimeter of 60.476 inches for the half cylinder. The outside perimeter of the shell regions in the model is:

$$P = 2(2.719 + 6.725 + 5.278 + 3.382 + 5.358) + 14.888$$
$$= 61.81 \text{ inches}$$

which is close to the actual shell perimeter. The thickness of shell regions 303 through 305 and 307 through 309 has been reduced from the 0.5 inch shell thickness to 0.08 inches to reduce the HEATING6 core required. Because temperature gradients across the stainless steel inner shell are very small due to its high thermal conductivity, this change has no impact on the temperature distribution in the basket. The channels are assumed to be centered on and in contact with the bottom edge of the basket spacer disk fuel cell openings, with the fuel assemblies smeared along the inner edge of the channels. The basket is assumed to be centered in the IF-300 Cask. During transport, the basket spacer disks will be resting on the cask inner shell. This assumption results in slight effects on the temperature of regions 101 and 112 and has a negligible impact on the overall results.

2. Fuel Region Thermal Conductivity

The effective thermal conductivity of the fuel assembly inside the channels was determined to account for the different fuel assembly materials (UO_2, zircaloy and argon), and to include the combined effects of radiation, conduction, and convection. The effective thermal conductivity of the fuel used in the initial run is taken from Reference 11, which gives temperature dependent effective thermal conductivity values within a modelled fuel assembly. These initial values are:

Temperature (°F)	Thermal Conductivity (Btu/min·in·°F)
400	2.222E-03
500	3.056E-03
600	3.611E-03
700	4.444E-03
800	5.278E-03
900	6.389E-03
1000	7.639E-03

The effective thermal conductivities of the fuel assemblies are iterated for each case using the average channel wall temperature, T_a, and the maximum assembly temperature, T_o. The fuel assembly is modelled as a finite heat generating slab of thickness 2a, surrounded by the channel walls as shown in Figure A-3.4-4.

The temperature difference between the fuel center and the inside of the channel wall is obtained from the correlation [A-3.6.1-12]:

$$T_o - T_s = \frac{q'''a^2}{2k_f}$$

where k_f is the effective fuel thermal conductivity, q''' is the volumetric heat generation rate (9.776E-03 Btu/min·in^3 from Section A-3.4.1.2.3), and a is the half-width of the assembly (2.639 inches from Section A-1.3.2). Rearranging, the effective thermal conductivity is given by:

$$k_f = \frac{q'''a^2}{2(T_o - T_s)}$$

The average channel wall temperature is conservatively calculated by averaging the temperatures at the edges of the assembly along the same vertical and horizontal grid lines on which the maximum temperature is determined. The calculation of the effective fuel conductivities for the normal conditions of transport is shown in Section A-3.6.2. The iterated conductivities are then inserted into the HEATING6 input file as a tabular function for the fuel conductivity. Iterations are made until either the peak fuel region temperature converges, or until the peak fuel region temperature decreases with further iterations (producing a conservative result). The resulting converged values of the effective thermal conductivity of the fuel assemblies for the Channelled BWR Fuel Basket arrangement inside the IF-300 Cask cavity are given below, with the associated average channel wall temperature.

EFFECTIVE FUEL THERMAL CONDUCTIVITIES

T_s (°F)	K (Btu/min-in-°F)
473.63	0.002150
473.63	0.002151
542.80	0.001814
542.89	0.001813
552.04	0.002484
552.66	0.002498
629.19	0.004269

629.21	0.004271
655.17	0.005624
655.32	0.005643
683.85	0.012907

3. Decay Heat Generation

The design basis decay heat load in the IF-300 Cask cavity during dry shipment is 40,000 Btu/hr [A-3.6.1-1]. The Channelled BWR Fuel Basket design allows for 17 BWR fuel assemblies, each assumed to have the same decay heat. The active fuel length is conservatively assumed to be 144 inches, and the fuel assembly is assumed to be smeared on the inside of the channel. The channel area from Section 1.3.2 is $(5.278 \text{ in})^2 = 27.857 \text{ in}^2$. The heat generation rate per unit volume per assembly is then:

$$q = \frac{40{,}000/17}{(144)(27.857)(60)} = 9.776E\text{-}03 \; Btu/min \cdot in^3$$

This is the value used in the HEATING6 Channelled BWR Fuel Basket analytical model for each fuel assembly.

4. Boundary Conditions

The following boundary conditions are used in the analytical model:

1) A constant temperature on the outside of the cask inner liner is assumed. The temperature was determined in Section A-3.4.1.1 using HTAS1 with the 40,000 Btu/hr heat load applied as a heat flux in the cask cavity.

2) An insulated surface is used on the axis of symmetry and on edges of the cask shell regions which only exist in the model due to the use of rectangular elements in the analytical model to approximate cylindrical geometries.

3) A radiation linkage between two parallel zircaloy surfaces is used to model radiation heat transfer between parallel fuel assembly channel surfaces.

4) A radiation linkage between a zircaloy and a parallel steel surface is used to

model radiation heat transfer between fuel assembly channels and either poison plate or cask inner shell parallel surfaces.

5) A radiation linkage from stainless steel to a gas surface is used to model radiation heat transfer from the poison plates to the surrounding gas regions.

6) A radiation linkage between two parallel stainless steel surfaces is used to model radiation heat transfer between poison plates and/or the cask inner shell.

7) A radiation linkage from zircaloy to a gas surface is used to model radiation heat transfer from the fuel assembly channels to the surrounding gas regions.

The values of the heat transfer coefficients h_r for the zirconium to zirconium, zirconium to steel, steel to gas and zirconium to gas radiation boundary condition used in the HEATING6 model is calculated as follows:

h_r is equal to the Stephan-Boltzman constant (σ) multiplied by the effective emissivity of the surface [A-3.6.1-4]. The value of σ is equal to 0.173E-08 Btu/hr-ft^2-°R^4 (2.002E-13 Btu/min-in^2-°R^4) [A-3.6.1-4]. The effective emissivity, ϵ_{eff} between two parallel surfaces is given by,

$$\varepsilon_{eff} = \frac{1}{\frac{1}{\varepsilon_1} + \frac{1}{\varepsilon_2} - 1}$$

where ϵ_1 is the emissivity of one surface and ϵ_2 is the emissivity of the opposing surface.

The emissivity of stainless steel is 0.587 [A-3.6.1-10], and the emissivity of zirconium is 0.4 [A-3.6.1-11]. The gas medium is treated as transparent and its presence in the path of radiation as a participating medium is ignored.

The effective emissivity ϵ_{eff} and the h_r for the zirconium to zirconium radiation boundary condition are then calculated as:

$$\epsilon_{eff} = 1/((1/0.4) + (1/0.4) - 1) = 0.25$$

and $h_r = \sigma * \epsilon_{eff} = 2.002E-13 * 0.25$

$= 5.005E-14$ Btu/min-in^2-°R^4

The effective emissivity ϵ_{eff} and the h_r for the zirconium to steel radiation boundary condition are then calculated as:

$$\epsilon_{eff} = 1/((1/0.4) + (1/0.587) - 1) = 0.312$$

and $h_r = \sigma * \epsilon_{eff} = 2.002E-13 * 0.312$

$= 6.246E-14$ Btu/min-in^2-°R^4

The effective emissivity ϵ_{eff} and the h_r for the zirconium to gas radiation boundary condition are then calculated as:

$$\epsilon_{eff} = 1/((1/0.4) + (1/1.0) - 1) = 0.4$$

and $h_r = \sigma * \epsilon_{eff} = 2.002E-13 * 0.4$

$= 8.008E-14$ Btu/min-in^2-°R^4

The effective emissivity ϵ_{eff} and the h_r for the steel to gas radiation boundary condition are then calculated as:

$$\epsilon_{eff} = 1/((1/587) + (1/1.0) - 1) = 0.587$$

and $h_r = \sigma * \epsilon_{eff} = 2.002E-13 * 0.587$

$= 1.175E-13$ Btu/min-in^2-°R^4

These values of effective emissivities are documented in Table A-3.2-2.

The maximum inner cavity centerline temperature predicted by the HTAS1 model in Section A-3.4.1.1 during normal conditions of transport is 207°F. However, a conservative value of 229°F for the inner shell region is used in this analysis.

Two consecutive analyses were performed for each of the cask cavity filled with argon gas cases before convergence of the maximum fuel temperature was achieved. For the case with the cask cavity cover gas replaced by steel to calculate the spacer disk temperature distribution, the temperature decreased

significantly from the initial to the subsequent analysis. Additional iterations would have resulted in lower fuel temperatures and therefore were not made.

The spacer disk temperature distribution was determined by averaging the temperature distribution obtained using the argon cover gas and the argon replaced by steel cases. The final steady state temperature distribution for these cases is shown in Section A-3.6.3.

The average argon temperature for the normal conditions of transport case is calculated by area weighted averaging of the argon filled cask temperature distribution. This calculation is shown in Section A-3.6.3. The results show that average argon (cover gas) temperature in the cask cavity during normal conditions of transport is 430°F.

3. Test Model

No test model of the IF-300 Channelled BWR Fuel Basket is utilized.

A-3.4.2 Maximum Temperatures

The maximum steady state temperature distribution for the IF-300 Cask body for normal conditions of transport is included in Section A-3.6.3. The maximum centerline inner cavity temperature predicted by the HTAS1 analytical model is 207°F, however a conservative value of 229°F is used in Section A-3.4.1.2 to calculate the maximum fuel rod cladding temperature. The maximum fuel rod cladding temperature for normal conditions of transport is 685°F based on the maximum inner cavity surface temperature of 229°F.

The maximum centerline temperatures for all cask body layers and maximum fuel rod cladding temperature is shown in Table A-3.4-3.

A-3.4.3 Minimum Temperatures

The enveloping analysis performed for the normal conditions of transport is based on a 130°F ambient temperature and a design basis heat load of 40,000 Btu/hr [A-3.6.1-2]. As stated in Volumes 1 and 2 [A-3.6.1-2], the operation of the IF-300 Cask at -40°F would result in fuel cladding temperatures which are significantly reduced (approximately 25%) from those occurring at

130°F. Therefore no further analysis for the fuel cladding is required.

The minimum temperature distribution for the IF-300 Cask with the Channelled BWR Fuel Basket occurs with no decay heat load in the cask cavity (empty basket) and an ambient temperature of -40°F. Since the steady state analysis of these conditions represents a trivial case, no calculations are performed. Instead it is assumed that all cask components would reach -40°F under steady state condition.

Currently, there is no requirement for minimum heat load in the IF-300 Cask cavity for the shipment of an empty IF-300 Cask [A-3.6.1-1]. These requirements are not affected by the Channelled BWR Fuel Basket.

A-3.4.4 Maximum Internal Pressures

Maximum cask internal cavity pressure for the normal conditions of transport is the sum of the cover gas pressure and residual water vapor pressure from water that may remain in the cask after draining operations. The cover gas (argon) pressure is assumed to follow the ideal gas relationship. The average argon temperature is 430°F as calculated in Section A-3.4.1.2. Then the cover gas pressure is given by:

$$P_{gas} = \frac{P_1 T_{gas}}{T_1} = \frac{14.7 \times (430+460)}{(460+70)}$$

$$\therefore P_{gas} = 24.7 \text{ psia}$$

The contribution to the cask inner cavity pressure due to residual water vapor pressure is determined using the cask cavity wall temperature. For this evaluation, it is conservatively assumed that the residual water temperature is at the maximum cavity temperature of 229°F. The residual water vapor pressure is [A-3.6.1-13]:

$$P_{vapor} = 20.4 \text{ psia}$$

The total pressure in the cask inner cavity is the sum of the partial pressures, i.e.,

$$P_{total} = P_{gas} + P_{vapor}$$

$$= 24.7 + 20.4 = 45.1 \text{ psia}$$

$$\therefore \quad P_{total} = 30.4 \text{ psig}$$

For the normal conditions of transport, the maximum cask cavity pressure of 30.4 psig is quite low in comparison to the minimum cask cavity relief pressure of 350 psig [A-3.6.1-2].

The maximum cask internal cavity pressure during normal conditions of transport with all the fuel rods ruptured is given in Section A-3.5.4.

A-3.4.5 Maximum Thermal Stresses

Maximum thermal stresses in the Channelled BWR Fuel Basket for normal conditions are provided in Section A-2.6.1.3 of this SAR.

A-3.4.6 Evaluation of Package Performance for Normal Conditions of Transport

The component temperatures and pressures for the IF-300 Cask with Channelled BWR Fuel Basket for normal conditions of transport show that they are all within allowable limits for the respective materials. As an input to Chapter A-2.0, the temperature for any component is a minimum of -40°F with the basket empty (-20°F when combined with other load cases), and a maximum of 229°F for cask inner cavity surface, 199°F for the cask outer shell, and 194°F for the neutron shield water jacket (barrel). The temperature distribution of the spacer disks is presented in Section A-3.4.1.2. The maximum fuel rod cladding temperature is 685°F.

Stresses in the Channelled BWR Fuel Basket are all within allowable limits for normal transport conditions. Details of the stress and fatigue evaluations are provided in Section A-2.6.1.3 of this SAR.

The maximum pressure in the cask cavity is 30.4 psig and the average cover gas temperature in the cask cavity is 430°F.

Table A-3.4-1

Keywords for Zones in HTAS1 Model

Zone Keyword	Material Name	Material Description
CAVITY	N/A	Void
INNER SHELL	SST304	Stainless Steel 304
SHIELDING	DURANIUM	Depleted Uranium
OUTER SHELL	SST304	Stainless Steel 304
NEUTRON SHIELD	H2OCON	Water, effective conductivity simulating natural convection during normal conditions of transport
WATER JACKET	SST304	Stainless Steel 304

Table A-3.4-2

Fin Area Calculations

Top Head Cover Total Fin Area: 15858.25 sq. in.

LARGER FINS		SMALLER FINS	
Dimensions, inches		Dimensions, inches	
Thick	1.125	Thick	1.5
Radial (total)	24.625	Radial (total)	14.875
Radial (leg)	6	Radial (leg)	6
Axial (total)	18.5	Axial (total)	15
Axial (leg)	9.5	Axial (leg)	6
Areas, sq. in.		Areas, sq. in.	
Top	27.70312	Top	22.3125
Bottom	6.75	Bottom	9
Outside	20.8125	Outside	22.5
Inside	10.6875	Inside	9
Face	287.9375	Face	143.25
Face	287.9375	Face	143.25
Total Area:	641.8281 sq. in.	Total Area:	349.3125 sq. in.

Bottom Head Total Fin Area: 13836.25 sq. in.

LARGER FINS		SMALLER FINS	
Dimensions, inches		Dimensions, inches	
Thick	1.125	Thick	1.5
Radial (total)	24.625(2)	Radial (total)	14.875(2)
Radial (leg)	6(2)	Radial (leg)	6(2)
Axial (total)	17	Axial (total)	13.5(1)
Axial (leg)	8	Axial (leg)	4.5(1)
Areas, sq. in.		Areas, sq. in.	
Top	27.70312	Top	22.3125
Bottom	6.75	Bottom	9
Outside	19.125	Outside	20.25
Inside	9	Inside	6.75
Face	251	Face	120.9375
Face	251	Face	120.9375
Total Area:	564.5781 sq. in.	Total Area:	300.1875 sq. in.

Notes:
1. Estimated value based on upper head.
2. Assumed same as upper head.

Table A-3.4-3

Cask Temperatures and Pressures
Normal Conditions of Transport

Parameter, Units	Value
Ambient Air Temperature, °F	130
Maximum Cask Cavity Heat Load, Btu/hr	40,000
Maximum Centerline Water Jacket Surface Temp., °F	194
Maximum Centerline Outer Shell Temperature, °F	199
Maximum Centerline Inner Cavity Surface Temp., °F	207
Maximum Fuel Rod Cladding Temperature, °F	685
Maximum Inner Cavity Pressure, psig	30.4

FIGURE WITHHELD UNDER 10 CFR 2.390

Figure A-3.4-1

HTAS1 Model of IF-300 Cask During Normal Condition of Transport

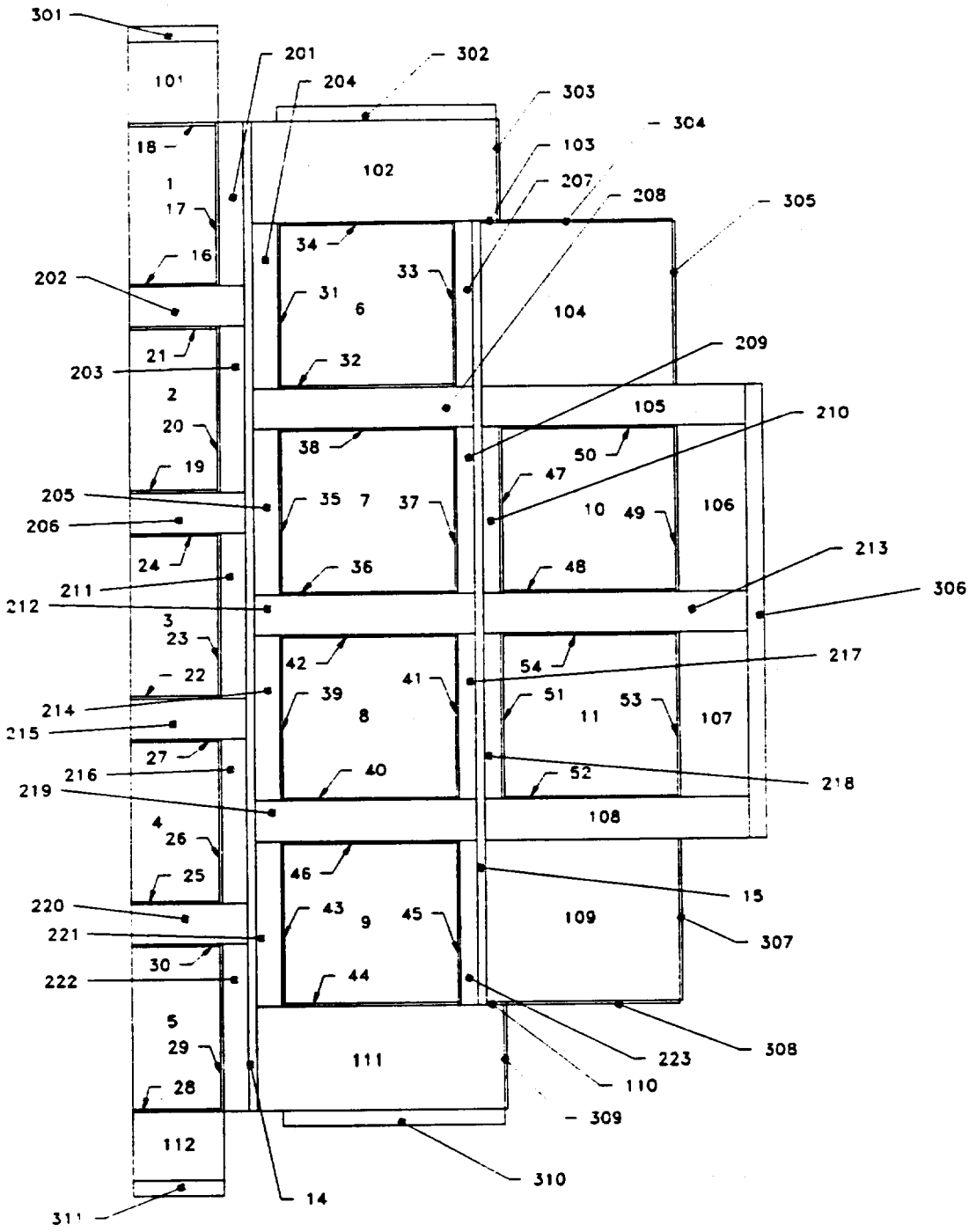

Figure A-3.4-2

HEATING6 Model Regions of IF-300 Channelled BWR Fuel Basket

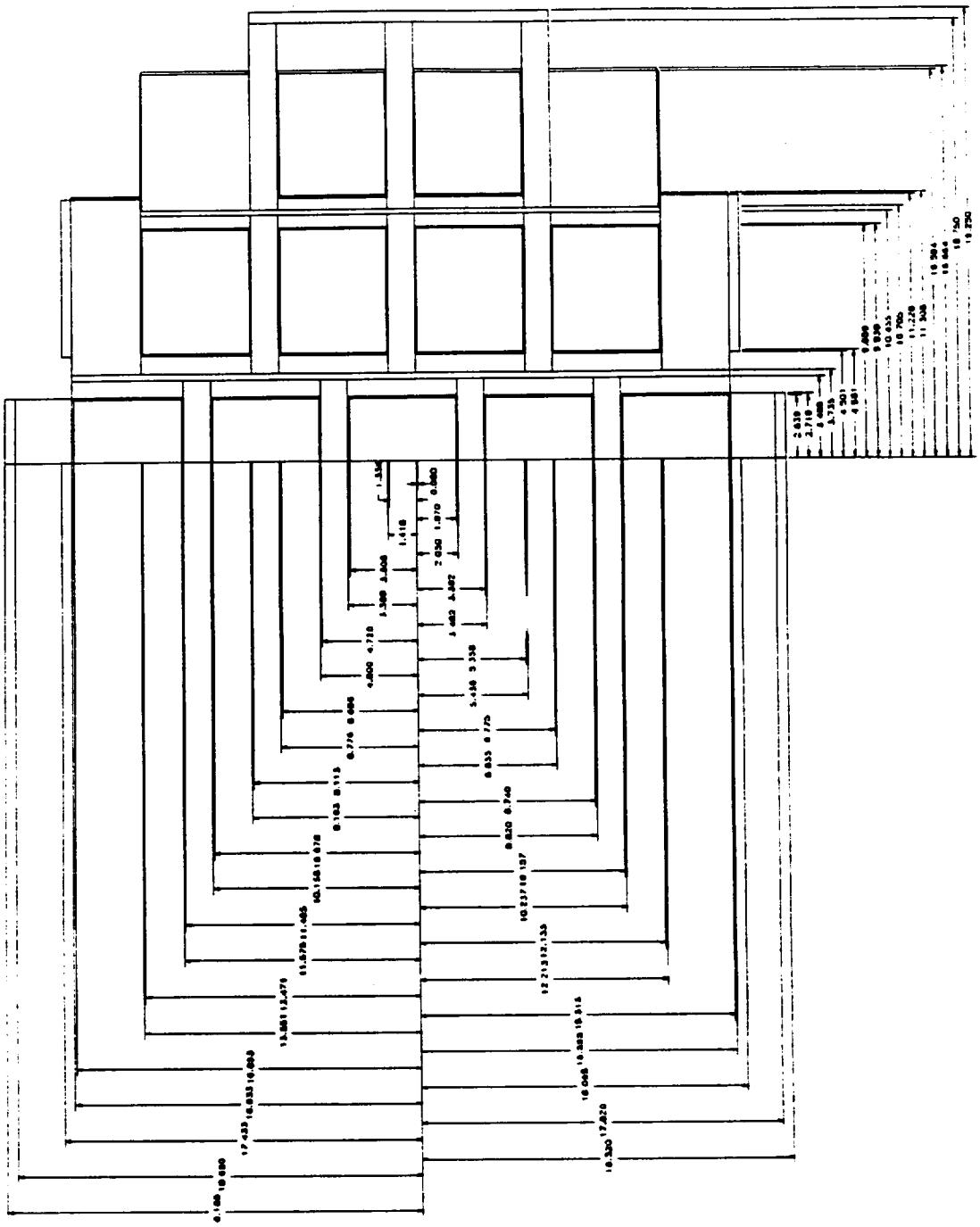

Figure A-3.4-3

HEATING6 Analytical Model Dimensions of
IF-300 Channelled BWR Fuel Basket

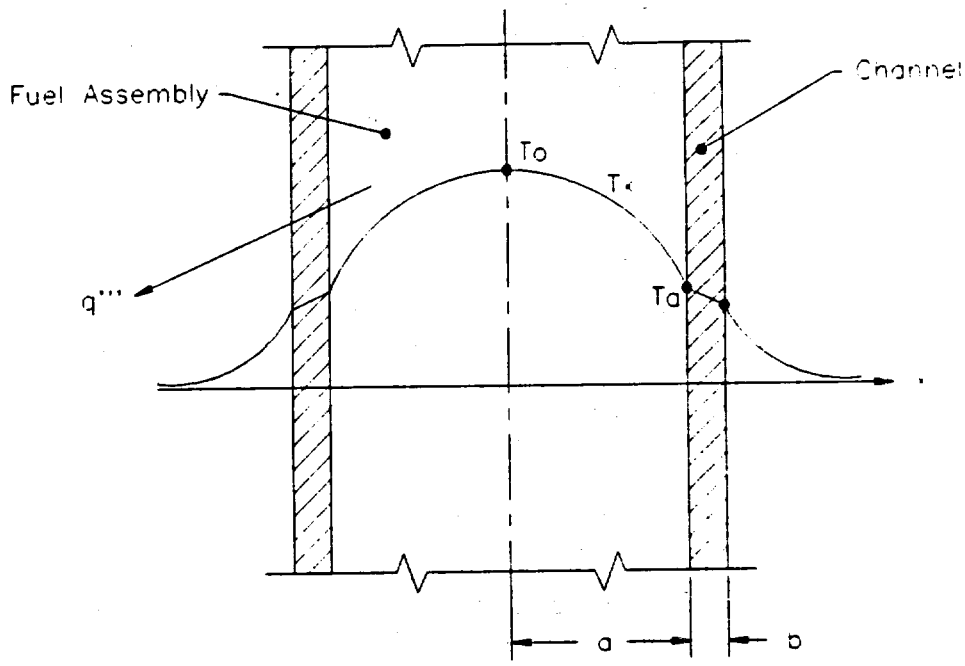

Figure A-3.4-4

Temperature Distribution in a
Heat Generating Slab for Fuel Region

A-3.5 Hypothetical Accident Thermal Evaluation

This section presents the thermal analysis of the IF-300 Cask with Channelled BWR Fuel Basket for the hypothetical accident thermal conditions defined in 10CFR71.73(c) [A-3.6.1-9]. The accident sequence considered is the free drop and puncture tests followed by a 30 minute exposure to a 1475°F fire thermal radiation environment having an emissivity of 0.9, assuming that the cask has an absorption coefficient of 0.83.

The cask is assumed to be separated from the skid. The corrugated barrel surrounding the neutron shielding cavity is assumed to be in place but ruptured due to a drop accident. The cask cavity remains sealed due to the integrity of the closure, valves, and rupture disk [A-3.6.1-2]. It is assumed that the initial temperature distribution within the cask at the start of the fire is the final steady state temperature distribution from the normal conditions of transport case described in Section A-3.4.

After the 30 minute exposure to fire, the cask is then subjected to an ambient temperature of 130°F with a solar heat load of 123 Btu/hr-ft^2 on the cask surfaces for a period of three hours [A-3.6.1-3 & 9]. This condition, termed the post-fire case, uses the temperature distribution within the cask at the end of the 30-minute fire as the initial temperature distribution.

The cask is allowed to reach the steady state after the three hour postfire case to obtain the final steady state thermal conditions following the accident and exposure to fire. The analytical models used in thermal evaluations during hypothetical accident conditions described above are given in Section A-3.5.1.

A-3.5.1 Thermal Models

Two analytical models similar to those used for the normal conditions of transport described in Section A-3.4.1 were developed to perform the thermal analysis of the IF-300 Cask with Channelled BWR Fuel Basket. The first analytical model uses modules HTAS1/HEATING6 [A-3.6.1-3 & 4] in the SCALE computer program system [A-3.6.1-5] to calculate the temperature distribution in the IF-300 Cask layers for the accident conditions described in Section A-3.5. The second analytical model uses module HEATING6 and the results of the first model as the constant temperature boundary conditions to calculate the detailed temperature distribution within the Channelled BWR Fuel Basket components and the maximum fuel rod cladding temperatures.

1. Cask Analytical Model Using HTAS1

The HTAS1 analytical model of the IF-300 Cask for the accident sequence is shown in Figure A-3.5-1. The model is exactly the same as that used for the normal conditions of transport (Figure A-3.4-1) except the NEUTRON SHIELD zone is modelled as air (material AIRCONV in Table A-3.2-1). The neutron shield is deleted from the model and replaced with air after the PREFIRE case in HTAS1. To account for radiation linkage between the newly exposed outer shell surface and the corrugated water jacket inside surface, emissivity values of 0.6 and 0.83 respectively are assumed for these surfaces [A-3.6.1-2]. The analytical sequences in HTAS1 applicable for the accident sequence is FIRE, POSTFIRE, and FINAL.

The solar heat load is not applied to the surface of the package during the FIRE transient. A value of 123 Btu/hr-ft^2 is applied to the cask surface during POSTFIRE and FINAL accident sequences [A-3.6.1-9].

The input file prepared for the HTAS1 model of the accident sequence described above is included in Section A-3.6.2. The HTAS1 results at the end of the 30-minute FIRE transient are also included in Section A-3.6.3 and summarized in Table A-3.5-1. The average values for cask surfaces tabulated are the averages along the length of the cask surface. The results show that the air filled neutron shield water jacket (barrel) acts as a thermal radiation barrier, thus limiting the heat input to the cask body from the fire.

The maximum centerline temperature at the end of the 30-minute FIRE transient is 340°F. The average cavity surface temperature over the entire cavity length and over the active fuel length portion of the fuel assembly is 386°F and 366°F, respectively.

The most limiting thermal conditions experienced by the cask internals are in the period following the 30-minute fire. The limiting nature of this analysis is due to the corrugated barrel of the empty neutron shield water jacket. This structure, which acts as a barrier to external thermal radiation during the fire, acts as an insulator to internal heat dissipation after the fire.

The HTAS1 results for the POSTFIRE sequence are summarized in Table A-3.5-2. The results show that the maximum cavity surface temperature of 656°F

occurs in the corner of the cavity at 50 minutes into the FIRE transient (20 minutes into the POSTFIRE sequence). The maximum centerline temperature for the cask inner cavity surface at that time is 405°F and the average cavity surface temperature is 464°F. The average cavity surface temperature over the active fuel length portion of the fuel assembly is 437°F. To calculate the maximum fuel rod cladding temperature during the POSTFIRE conditions, a conservative value of 454°F is used. The maximum centerline temperature of 407°F for the cask inner cavity surface occurs at 60 minutes into the FIRE transient (30 minutes into the POSTFIRE sequence). The average cavity surface temperature over the entire cavity length and over the active fuel length portion of the fuel assembly at this time is 463°F and 436°F, respectively.

The centerline cavity surface temperature at the end of the 3 hours and 30 minutes FIRE transient (3 hours after the fire) is 393°F. The maximum cavity surface temperature is 412°F. The average cavity surface temperature over the entire cavity length and over the active fuel length portion of the fuel assembly is 400°F and 401°F, respectively. The HTAS1 results at 50 minutes, 60 minutes, and 3 hours 30 minutes into the FIRE transient (20 minutes, 30 minutes, and 3 hours into the POSTFIRE sequence) are shown in Section A-3.6.3.

The temperature distribution at the end of the 3 hour POSTFIRE transient is used as an input to calculate the final steady state thermal conditions following the accident and exposure to fire (FINAL sequence in HTAS1).

The HTAS1 results for the FINAL sequence are summarized in Table A-3.5-3. The results show that the post-accident final steady state is reached after 11 iterations. The results of the final steady state temperature distribution for the post-accident conditions are included in Section A-3.6.3. The results show that the centerline cavity surface temperature is 327°F which is also the maximum cask cavity surface temperature. The centerline shell temperature is 319°F which is also the maximum shell temperature and the centerline neutron shield water jacket (barrel) surface temperature is 215°F which is also the maximum surface temperature.

2. Basket Analytical Model Using HEATING6

The purpose of this analytical model is to perform the thermal analyses of the IF-300 Cask with Channelled BWR Fuel Basket for the accident conditions described in Section A-3.5. The parameters calculated include the peak fuel rod cladding temperature, the spacer disk temperature distribution, and the average cavity cover gas temperature.

The computer code HEATING6 [A-3.6.1-4] is used to model the BWR basket. The HEATING6 model is exactly the same as that used for the evaluation of normal conditions of transport shown in Figures A-3.4-2 and A-3.4-3. All the modeling assumptions, methods for calculating effective fuel thermal conductivity, spacer disk temperature distribution and average cavity cover gas (argon) temperatures are exactly the same as the normal conditions of transport described in Section A-3.4.1.2. The only difference is the use of 453.7°F as the constant temperature boundary conditions on the cask inner cavity surface instead of the 229°F used during normal conditions of transport. The results of Section A-3.5.1.1 using the HTAS1 control module during FIRE, POSTFIRE, and FINAL accident sequences show that the maximum average cavity surface temperature over the active fuel length portion of the fuel assembly is 437°F occurring at 20 minutes into the 3 hour POSTFIRE analytical sequence (50 minutes into the FIRE transient). In the HEATING6 model, a conservative value of 453.7°F is used.

The HEATING6 results obtained using this temperature for the cask inner cavity surface will give bounding results for the FIRE and FINAL steady state accident sequence.

The HEATING6 input file using argon as the cask cavity cover gas during accident conditions is included in Section A-3.6.3. The results of the analysis show that the maximum fuel rod cladding temperature is 769°F and the average argon cover gas temperature is 580°F. Also, the steady state temperature distribution convergence is obtained after the 8th iteration. The steady state temperature distribution is included in Section A-3.6.3.

3. Test Model

No test model of the IF-300 Channelled BWR Fuel Basket is utilized.

A-3.5.2 Package Conditions and Environment

The limiting accident sequence considered for the cask thermal evaluation is the free drop and puncture tests followed by a 30 minute 1,475°F fire with a 3 hour post fire transient followed by a final post accident steady state condition.

The IF-300 Cask with the Channelled BWR Fuel Basket is assumed to be separated from the skid. The corrugated water jacket surrounding the neutron shielding cavity is assumed to be in place but ruptured due to the cask drop accident. The cask inner cavity remains sealed due to the integrity of the closure, valves, and rupture disk. The liquid neutron shield (water) is assumed to be lost and air is assumed to be present in the neutron shield cavity. The results of the analysis show that the IF-300 Cask internals experience the most limiting thermal conditions during the 3-hour post-fire transient as shown in Section A-3.5.1.

A-3.5.3 Package Temperatures

The results of Section A-3.5.1 show that the maximum inner cavity surface temperature is 656°F and occurs during the 3 hour period following the fire transient. The maximum shell temperature is 1,096°F and occurs at the end of the 30 minute fire transient. The maximum water jacket temperature is 1,315°F and occurs at the end of the 30 minute fire transient. The maximum fuel rod cladding temperature during any of the accident conditions is 769°F and occurs during the 3 hour post-fire period. These results are shown in Tables A-3.5-1, A-3.5-2, and A-3.5-3.

A-3.5.4 Maximum Internal Pressures

The maximum cask internal pressure for the accident conditions is calculated by the same methods used for the normal conditions of transport documented in Section A-3.4.4, except it is conservatively assumed that 100% of fuel rods release their fission and fill gases into the cask cavity. The total internal cavity pressure is then the sum of cover gas (argon) pressure, residual water vapor pressure and the fuel rod residual fission and fill gas pressure.

The cover gas pressure is assumed to follow the ideal gas relationship. The maximum average argon temperature

during the accident conditions as calculated in Section A-3.5.1.2 is 580°F. The cover gas pressure is given by:

$$P_{gas} = \frac{P_1 \, T_{gas}}{T_1} = \frac{14.7 \times (580+460)}{(460+70)}$$

$$= 28.8 \text{ psia}$$

The contribution to the cask inner cavity pressure due to residual water vapor pressure is determined using the centerline cavity temperature at the end of the 3 hour post fire transient of 393°F (Section A-3.5.1.1). The residual water vapor pressure is 228 psia [A-3.6.1-13].

The fuel rod residual gas pressure is calculated by first determining the free volume in the cask internal cavity as follows:

For the worst case accident, it is assumed that all of the fuel rods rupture and that all of the residual gases in the fuel rods are released into the free volume of the cask cavity. The residual gases are assumed to include the helium fill gas and gaseous fission products. The volume occupied by the gases is equal to the cask cavity volume minus the volume of the basket with fuel assemblies. The volume of the cask internal cavity is 115.2 ft^3. The volume of 17 fuel assemblies with channels is 24.0 ft^3. The volume of spacer disks, support rods and poison plates is 10.9 ft^3. The volume of depleted uranium shield blocks and lifting lug assemblies is 0.6 ft^3. The volume occupied by gases (free volume in cask cavity) is then 115.2-24.0-10.9-0.6 = 79.7 ft^3.

The fuel rod helium fill gas is assumed to fill the annulus between the fuel and the cladding, and the plenum at 5 atmospheres at 60 °F. The I.D. of the cladding is 0.451 inches, the O.D. of the fuel pellet is 0.410 inches, and the length of the plenum is 9.48 inches [A-3.6.1-14]. The volume of helium in each fuel rod is then:

$$V = 150\left(\frac{\pi}{4}\right)(0.451^2 - 0.410^2) + 9.48\left(\frac{\pi}{4}\right)0.451^2 = 5.67 \; in^3$$

The number of moles of helium in each rod is then:

$$n = \frac{PV}{RT} = \frac{5 \times 14.7 \cdot 5.67}{10.73(460+60)12^3} = 4.323E\text{-}5 \; moles$$

The volumes of the fission products in each fuel assembly at STP (32°F and 1 atm), interpolated for a maximum burnup of 35 GWD/MTU, neglecting tritium, are 19.3 liters (.682 ft^3) of krypton-85 and 180.5 liters (6.374 ft^3) of xenon-131 [A-3.6.1-15]. The number of moles of fission products in each fuel assembly is therefore:

$$n = \frac{PV}{RT} = \frac{14.7 \cdot (.682+6.374)}{10.73(32+460)} = .0196 \; moles$$

The total number of moles of gas in the fuel assemblies is then equal to:

$$n = 17[(.0196)+62(4.323E-5)] = 0.379 \text{ moles}$$

The average temperature of argon in the cask cavity is 580°F from Section 3.5.1.2. The cask pressure increase due to the rupture of the fuel rods is then equal to:

$$P = \frac{nRT}{V} = \frac{.379 \cdot 10.73(460+T)}{79.7} \; psia$$

$$P = \frac{.379 \cdot 10.73(460+580)}{79.7}$$

Pressure due to fuel rod gas P = 53.1 psi.

The maximum cask internal pressure for accident conditions is then:

28.8 + 228 + 53.1 = 309.9 psia = 295.2 psig

For the accident conditions, the maximum cask cavity pressure at 295.2 psig is less than the minimum cask cavity relief pressure at 350 psig [A-3.6.1-2].

For the normal conditions of transport, the pressure in the cask cavity is 45.1 psia (Section A-3.4.4). If it is assumed that all of the fuel rods rupture during the normal conditions of transport and the residual gases in the fuel rods are released in the free volume of the cask cavity, then the maximum cavity pressure will increase. Using the same methodology as the accident case described above, the cavity pressure increase due to the release of the residual gases is calculated as follows:

The average temperature of the argon cover gas in the cask cavity during the normal conditions of transport is calculated in Section A-3.4.1.2 to be 431°F. Using this temperature, the pressure increase due to the fuel rod residual gas release in the cask cavity is 45.5 psi. This will result in

total pressure of 90.6 psia (45.1 + 45.5) in the cask cavity during normal conditions of transport for the rupture of all fuel rods accident.

A-3.5.5 Maximum Thermal Stresses

Maximum thermal stresses in the Channelled BWR Fuel Basket for accident conditions are provided in Section A-2.7.3.3 of this CSAR.

A-3.5.6 Evaluation of Package Performance for Hypothetical Accident Thermal Conditions

The results of the thermal evaluation of the IF-300 Cask with Channelled BWR Fuel Basket show that none of the temperatures in the accident sequence exceed temperature limitations of the cask and basket materials. The liquid neutron shield is assumed to be lost during the accident but the cask inner cavity remains intact. The maximum fuel rod cladding temperature is also well below the temperature limit at which cladding failure by creep rupture would be predicted. The maximum internal pressures in the cask cavity also are below the set points of rupture disks and relief valves. Therefore, the cask cavity will not release its contents to the environment or lose containment function for the postulated accident sequence.

Table A-3.5-1

Cask Body Temperatures and Pressures - End of 30 Minute Fire Transient

Cask Layer	Maximum Centerline Temperature (°F)	Maximum Temperature (°F)	Average Temperature Over the Entire Surface (°F)	Average Temperature Over the Active Fuel Lgth. (°F)
Inner Cavity Surface	340	535	386	366
Outer Shell	497	1,096	773	N/A
Barrel	1,281	1,315	1,287	N/A

Parameter, units	Value
Ambient Air Temperature, °F	1,475
Maximum Cask Cavity Heat Load, Btu/hr	40,000
Maximum Inner Cavity Pressure Due to Argon and Residual Water, psig	< 242
Maximum Pressure Rise From All the Fuel Rods Rupture, psi	< 53
Maximum Total Accident Pressure in the Cask Cavity, psig	< 295
Maximum Fuel Rod Cladding Temperature, °F	< 769