


SOFTWARE RELEASE NOTICE

01. SRN Number: PA-SRN-103		
02. Project Title: FEHMN - Finite Element Heat and Mass Transfer Code		Project No. 20-5704-192
03. SRN Title: FEHMN		
04. Originator/Requestor: Budhi Sagar		Date: 01/22/96
05. Summary of Actions <ul style="list-style-type: none"> <input type="checkbox"/> Release of new software <input type="checkbox"/> Release of modified software: <ul style="list-style-type: none"> <input type="checkbox"/> Enhancements made <input type="checkbox"/> Corrections made <input type="checkbox"/> Change of access software <input checked="" type="checkbox"/> Software Retirement 		
06. Persons Authorized Access		
Name	RO/RW	A/C/D
N/A		
07. Element Manager Approval: <i>RG Bacc</i>		Date: <i>1/26/96</i>
08. Remarks: Not considered important to regulatory reviews in revised FY96 OPS Plans.		

SOFTWARE RELEASE NOTICE

01. SRN Number: PA-SRN-037		
02. Project Title: FEHMN - Finite Element Heat and Mass Transfer Code.		Project No. 20-5704-192
03. SRN Title: FEHMN		
04. Originator/Requester: T. Ratchford 		Date: 09/23/94
05. Summary of Actions <input checked="" type="checkbox"/> Release of new code admitted to CM System (B. Baca) <input type="checkbox"/> Release of modified code: <input type="checkbox"/> Enhancements made <input type="checkbox"/> Corrections made <input checked="" type="checkbox"/> Change of access code (R. Janetzke)		
06. Persons Authorized Access		
Name	RO/RW	A/C/D
07. Element Manager Approval:		Date:
08. Remarks: A copy of the software package FEHMN, Ver. 1.1 was retained by the Principle Investigator for use in the CNWRA work center; therefore, a new release may not be necessary.		

SOFTWARE SUMMARY FORM

01. Summary Date: 09/22/94		02. Summary prepared by (Name and Phone) T.J. Ratchford 522-3083		03. Summary Action: New	
04. Software Date: 9/22/94		05. Short Title: FEHMN			
06. Software Title: FEHMN - Finite Element Heat and Mass Transfer Code.				07. Internal Software ID: NONE	
08. Software Type: <input type="checkbox"/> Automated Data System <input checked="" type="checkbox"/> Computer Program <input type="checkbox"/> Subroutine/Module		09. Processing Mode: <input type="checkbox"/> Interactive <input type="checkbox"/> Batch <input checked="" type="checkbox"/> Combination		10. APPLICATION AREA A. General: <input checked="" type="checkbox"/> Scientific/Engineering <input type="checkbox"/> Auxiliary Analyses <input type="checkbox"/> Total System PA <input type="checkbox"/> Subsystem PA <input type="checkbox"/> Other b. Specific:	
11. Submitting Organization and Address: CNWRA, SwRI, San Antonio, Texas			12. Technical Contact(s) and Phone: B. Baca 210-522-3805		
13. Narrative: FEHMN - FEHMN simulates non-isothermal multi-phase multi-component flow in porous media. It is applicable to natural-state studies of geothermal systems and ground-water flow.					
14. Computer Platform CRAY/XMP		15. Computer Operating System: UNIX		16. Programming Language(s): FORTRAN	
17. Number of Source Program Statements: 216313 lines of code		18. Computer Memory Requirements: UNKNOWN		19. Tape Drives: NONE	
20. Disk/Drum Units: N/A		21. Graphics: UNKNOWN			
22. Other Operational Requirements NONE					
23. Software Availability: <input checked="" type="checkbox"/> Available <input type="checkbox"/> Limited <input type="checkbox"/> In-House ONLY			24. Documentation Availability: <input checked="" type="checkbox"/> Available <input type="checkbox"/> Inadequate <input type="checkbox"/> In-House ONLY		
25. Submission Package Status: Acceptance Criteria: Met <input checked="" type="checkbox"/> Not Met <input type="checkbox"/> Software QA Assessment: Successful <input checked="" type="checkbox"/> Unsuccessful <input type="checkbox"/> Code Custodian: <u>T.J. Ratchford</u> Date: <u>9/23/94</u>					

sn423(10) ls -l

total 3365

drwxr-x---	2	tjr1	tjr1
-rw-r-----	1	tjr1	tjr1
drwxr-x---	21	tjr1	tjr1
-rw-r-----	1	tjr1	tjr1
-rw-r-----	1	tjr1	tjr1

sn423(11)

sn423(11)

sn423(11)

sn423(11)

sn423(11)

sn423(11)

4096	Sep 22 13:34	objects
11292000	Sep 22 13:21	objects_.tar
4096	Sep 22 13:27	src
2465792	Sep 22 13:22	src_file.tar
13023	Sep 22 13:22	verify.dat

9/22/94 TJR

134.20.1.1 14:35:43

FEHM

ENVIRONMENT SETUP:

Before compiling and linking your directory has to be setup as shown below, with the *.f and *.c files under the appropriate directory in ~fehm/src. The *.h and *.dat files need to go under ~fehm/objects.

```

|-- /src --|-- /airsj ----- *.f
|-- /book_t ----- *.f & *.c
|-- /cont_t ----- *.f
|-- /dpdpj ----- *.f
|-- /dualj ----- *.f
|-- /equsj ----- *.f
|-- /main_t ----- *.f & *.c
|-- /mult_t ----- *.f
|-- /optsj ----- *.f
|-- /read_t ----- *.f
|-- /solve_new -- *.f
|-- /solvj ----- *.f
|-- /strsj ----- *.f
|-- /ther_low --- *.f
|-- /therj ----- *.f
|-- /time_sun --- *.f
|-- /tradj ----- *.f
|-- /user_con --- *.f
|-- /welbj ----- *.f

~/fehm --|
|-- /objects --|-- *.h          [include files]
|-- *.dat       [example input files]
|-- *.o         [object files]
|-- xfehmn      [executable]

```

this structure can be setup easily by the following:

```

cd ~/fehm
ftp mira
name(): anonymous
password:
ftp> cd pub/fehm
ftp> binary
ftp> get src_files.tar
ftp> get objects_files.tar
ftp> quit
tar xvf src_files.tar
tar xvf objects_files.tar

```

TO COMPILE AND LINK:

```

cd ~/fehm/objects
make -f makefile_sun      -OR-  make -f makefile_hp

```

TO RUN:

```

cd ~/fehm/objects
xfehmn

```

[you can hit carriage return for all input, except for
 "Enter name for inpt -- default file name: fehmn.dat"
 where the name of the input file needs to be entered -
 these typically are *.dat files]

LISTING OF FILES AND LOCATION:

```
~/fehm/src/airsj/airctr.f
~/fehm/src/airsj/geneq2.f
~/fehm/src/airsj/gensl2.f
~/fehm/src/airsj/thrair.f

~/fehm/src/book_t/avs_prefix.f
~/fehm/src/book_t/avsascii_con.f
~/fehm/src/book_t/avsascii_cord.f
~/fehm/src/book_t/avsascii_head.f
~/fehm/src/book_t/avsascii_mat.f
~/fehm/src/book_t/avsascii_s.f
~/fehm/src/book_t/avsascii_stru.f
~/fehm/src/book_t/avsascii_v.f
~/fehm/src/book_t/avsbin_geo.c
~/fehm/src/book_t/avsbin_head.c
~/fehm/src/book_t/avsbin_node.c
~/fehm/src/book_t/avsio.f
~/fehm/src/book_t/c_io.c
~/fehm/src/book_t/contr.f
~/fehm/src/book_t/contrj.f
~/fehm/src/book_t/data.f
~/fehm/src/book_t/disk.f
~/fehm/src/book_t/elem_type.f
~/fehm/src/book_t/flxo.f
~/fehm/src/book_t/gendat.f
~/fehm/src/book_t/namefile2.f
~/fehm/src/book_t/peint.f
~/fehm/src/book_t/plot.f
~/fehm/src/book_t/radius.f
~/fehm/src/book_t/rarng.f
~/fehm/src/book_t/read_avsio.f
~/fehm/src/book_t/resetv.f
~/fehm/src/book_t/veloc.f
~/fehm/src/book_t/wrtout.f
~/fehm/src/book_t/zeroi_out.f
~/fehm/src/book_t/zeror_out.f

~/fehm/src/cont_t/bnswer.f
~/fehm/src/cont_t/co2ctr.f
~/fehm/src/cont_t/outbnd.f
~/fehm/src/cont_t/varchk.f

~/fehm/src/dpdpj/crdpdp.f
~/fehm/src/dpdpj/ctdpdp.f
~/fehm/src/dpdpj/dpdp.f
~/fehm/src/dpdpj/dpdp3.f
~/fehm/src/dpdpj/dpdpfa.f
~/fehm/src/dpdpj/dpdpfh.f
~/fehm/src/dpdpj/dpdpta.f
```

```

~/fehm/src/dpdpj/gensdp.f
~/fehm/src/dpdpj/gensdp3.f
~/fehm/src/dpdpj/gentdp.f
~/fehm/src/dpdpj/indpdp.f
~/fehm/src/dpdpj/rddpdp.f
~/fehm/src/dpdpj/rdof_dp2.f
~/fehm/src/dpdpj/rdof_dp2a.f
~/fehm/src/dpdpj/rdof_dp3.f

~/fehm/src/dualj/dual.f
~/fehm/src/dualj/dualex.f
~/fehm/src/dualj/dualfa.f
~/fehm/src/dualj/dualfh.f
~/fehm/src/dualj/dualta.f
~/fehm/src/dualj/dualtx.f

~/fehm/src/equsj/geneq1.f
~/fehm/src/equsj/geneq3.f
~/fehm/src/equsj/geneqc.f

~/fehm/src/main_t/allocmem.f
~/fehm/src/main_t/bcon.f
~/fehm/src/main_t/close_files.f
~/fehm/src/main_t/cntlin.f
~/fehm/src/main_t/cntlio.f
~/fehm/src/main_t/datchk.f
~/fehm/src/main_t/daycrl.f
~/fehm/src/main_t/fehmn.f
~/fehm/src/main_t/file_prefix.f
~/fehm/src/main_t/fimpf.f
~/fehm/src/main_t/initdata.f
~/fehm/src/main_t/iofile.f
~/fehm/src/main_t/mallocf.c
~/fehm/src/main_t/min_max.f
~/fehm/src/main_t/mmgetblk.f
~/fehm/src/main_t/mmrelblk.f
~/fehm/src/main_t/near3.f
~/fehm/src/main_t/null.f
~/fehm/src/main_t/setparams.f
~/fehm/src/main_t/setunits.f
~/fehm/src/main_t/sfn2r.f
~/fehm/src/main_t/sfn3r.f
~/fehm/src/main_t/startup.f
~/fehm/src/main_t/steady.f
~/fehm/src/main_t/storsx.f
~/fehm/src/main_t/termin.f
~/fehm/src/main_t/termio.f
~/fehm/src/main_t/timcrl.f
~/fehm/src/main_t/writeio.f

~/fehm/src/mult_t/anonp.f
~/fehm/src/mult_t/determ.f
~/fehm/src/mult_t/gencof.f
~/fehm/src/mult_t/gncf2.f
~/fehm/src/mult_t/gncf3.f
~/fehm/src/mult_t/lubksb0.f
~/fehm/src/mult_t/ludcmp0.f
~/fehm/src/mult_t/pbflat.f
~/fehm/src/mult_t/pebi.f
~/fehm/src/mult_t/pebi3.f
~/fehm/src/mult_t/pebiq.f

```

```

~/fehm/src/mult_t/psplit.f
~/fehm/src/mult_t/shap2r.f
~/fehm/src/mult_t/shap3p.f
~/fehm/src/mult_t/shap3r.f
~/fehm/src/mult_t/shap3t.f
~/fehm/src/mult_t/split.f
~/fehm/src/mult_t/tettst.f

~/fehm/src/optsj/gensl1.f
~/fehm/src/optsj/gensl3.f
~/fehm/src/optsj/gensl4.f
~/fehm/src/optsj/manage_derivative_storage.f
~/fehm/src/optsj/normal.f
~/fehm/src/optsj/normal_uc.f
~/fehm/src/optsj/rd1dof.f
~/fehm/src/optsj/rd2dof.f
~/fehm/src/optsj/rd3dof.f
~/fehm/src/optsj/setord.f
~/fehm/src/optsj/switch.f
~/fehm/src/optsj/switchb.f

~/fehm/src/read_t/geoin.f
~/fehm/src/read_t/incond.f
~/fehm/src/read_t/incoord.f
~/fehm/src/read_t/inctrl.f
~/fehm/src/read_t/infiles.f
~/fehm/src/read_t/inflo2.f
~/fehm/src/read_t/inflow.f
~/fehm/src/read_t/inhflx.f
~/fehm/src/read_t/inmentat.f
~/fehm/src/read_t/innode.f
~/fehm/src/read_t/inpatran.f
~/fehm/src/read_t/inperm.f
~/fehm/src/read_t/inpres.f
~/fehm/src/read_t/input.f
~/fehm/src/read_t/inrock.f
~/fehm/src/read_t/intime.f
~/fehm/src/read_t/renum.f
~/fehm/src/read_t/scanin.f
~/fehm/src/read_t/setzone.f
~/fehm/src/read_t/zone.f

~/fehm/src/solve_new/constant_value.f
~/fehm/src/solve_new/equal_array.f
~/fehm/src/solve_new/renumber_array.f
~/fehm/src/solve_new/residual.f
~/fehm/src/solve_new/solve_new.f
~/fehm/src/solve_new/sub_bksub1.f
~/fehm/src/solve_new/sub_bksub2.f
~/fehm/src/solve_new/sub_bksub3.f
~/fehm/src/solve_new/sub_bksub4.f
~/fehm/src/solve_new/sub_gmres1.f
~/fehm/src/solve_new/sub_gmres2.f
~/fehm/src/solve_new/sub_gmres3.f
~/fehm/src/solve_new/sub_gmres4.f
~/fehm/src/solve_new/sub_ilu1.f
~/fehm/src/solve_new/sub_ilu2.f
~/fehm/src/solve_new/sub_ilu3.f
~/fehm/src/solve_new/sub_ilu4.f

~/fehm/src/solvj/lubksb.f

```



```
~/fehm/src/solvj/ludcmp.f
~/fehm/src/solvj/nopcnr.f
~/fehm/src/solvj/nopcnv.f
~/fehm/src/solvj/nrmlz4.f
~/fehm/src/solvj/slvesu.f
~/fehm/src/solvj/solve.f
~/fehm/src/solvj/solve2.f
~/fehm/src/solvj/solve3.f
~/fehm/src/solvj/solve4.f
~/fehm/src/solvj/solven.f
~/fehm/src/solvj/storag.f

~/fehm/src/strsj/stress.f

~/fehm/src/ther_low/psatl.f
~/fehm/src/ther_low/vaporl.f

~/fehm/src/therj/cappr.f
~/fehm/src/therj/coeffc.f
~/fehm/src/therj/dvacalc.f
~/fehm/src/therj/enthp.f
~/fehm/src/therj/porosi.f
~/fehm/src/therj/psat.f
~/fehm/src/therj/rlperm.f
~/fehm/src/therj/sice.f
~/fehm/src/therj/sther.f
~/fehm/src/therj/thermw.f
~/fehm/src/therj/thrmwc.f
~/fehm/src/therj/vcon.f
~/fehm/src/therj/vfcal.f
~/fehm/src/therj/vgcap.f
~/fehm/src/therj/vgrlp.f

~/fehm/src/time_sun/dated.F
~/fehm/src/time_sun/tyming.F

~/fehm/src/tradj/cnswer.f
~/fehm/src/tradj/concen.f
~/fehm/src/tradj/coneq1.f
~/fehm/src/tradj/contrc.f
~/fehm/src/tradj/csolve.f
~/fehm/src/tradj/diskc.f
~/fehm/src/tradj/gencon.f
~/fehm/src/tradj/mult_rxn.f
~/fehm/src/tradj/node_rxn.f
~/fehm/src/tradj/plotc1.f
~/fehm/src/tradj/rdcon.f
~/fehm/src/tradj/read_rxn.f
~/fehm/src/tradj/resettrc.f
~/fehm/src/tradj/rxn_product.f
~/fehm/src/tradj/setup_rxn.f
~/fehm/src/tradj/solstore.f
~/fehm/src/tradj/thermc.f
~/fehm/src/tradj/userc.f
~/fehm/src/tradj/wrtcon.f

~/fehm/src/user_con/user_ymf.f

~/fehm/src/welbj/binghm.f
~/fehm/src/welbj/casson.f
~/fehm/src/welbj/cubic.f
```

~/fehm/src/welbj/drill.f
~/fehm/src/welbj/film.f
~/fehm/src/welbj/fourth.f
~/fehm/src/welbj/fprop.f
~/fehm/src/welbj/heatb.f
~/fehm/src/welbj/htcchg.f
~/fehm/src/welbj/nearn.f
~/fehm/src/welbj/newton.f
~/fehm/src/welbj/permp.f
~/fehm/src/welbj/power.f
~/fehm/src/welbj/ghuser.f
~/fehm/src/welbj/rock.f
~/fehm/src/welbj/welbor.f

~/fehm/objects/avsio.h
~/fehm/objects/avsio.h
~/fehm/objects/comai.h
~/fehm/objects/combi.h
~/fehm/objects/comci.h
~/fehm/objects/comdi.h
~/fehm/objects/comdti.h
~/fehm/objects/comei.h
~/fehm/objects/comfi.h
~/fehm/objects/comgi.h
~/fehm/objects/comhi.h
~/fehm/objects/comii.h
~/fehm/objects/comji.h
~/fehm/objects/comki.h
~/fehm/objects/comrxnb.h
~/fehm/objects/comrxni.h
~/fehm/objects/comxi.h
~/fehm/objects/davidi.h

FEHMN Fortran Program Static and Dynamic Analysis

August 31, 1994

Earl S. Marwil
John E. Tolli
Scientific Computing Unit
Idaho National Engineering Laboratory

DRAFT

1. Introduction

This analysis was performed on a version of the code which was converted to run on the INEL CRAY-XMP computer from a Fortran source provided by Southwest Research Institute (SwRI).

One sample problem ("verify.dat") was used along with the source code. The program was analyzed using the Craft (Cross Reference Analysis of Fortran) tool, FORWARN, the Fortran 77 analyzer, and PC-Metric. These tools provide static analysis, coverage analysis, and complexity analysis.

It was noted that the program aborted when loaded with a core preset of indefinite. The program was therefore loaded with a core preset of zero for the dynamic analyses shown in the optimization and coverage sections of this report.

2. References

- [1] N.H. Marshall and E.S. Marwil, Cross Reference Analysis of Fortran (CRAFT), EG&G-CATT-9198, EG&G Idaho, Inc., July 1991.
- [2] Fortran 77 Analyzer User's Manual, National Bureau of Standards, NBS GCR 81-359, 1981
- [3] FORWARN User's Guide, Quibus Enterprises, Inc., July 1991.
- [4] PC-Metric User's Guide, SET Laboratories, Inc., 1987.

3. Functions

The FEHMN program contains 222 Fortran routines. It also contains 5 C routines ("avsbin_geo", "avsbin_head", "avsbin_node", "c_io", "mallocf") which were not analyzed.

There are no alternate entry points.

There are 5 extraneous subroutines:

pbflat, psplit, shap3t, solve4, userc.

/setup/	solid_fl	undefined, unused
/wb6/	tempar	defined, unused

There are several instances of a common block not being used by a module in which it is declared:

Block name	Modules declaring but not using
/bn_pass/	allocmem, coneql, csolve, dpdp3, dpdpfa, dpdpfh, dpdpta, dualfa, dualfh, dualta, gencon, geneq1, geneq2, geneq3, geneqc, gentdp
/co2/	airctr, bcon, cappr, coneql, crdpdp, data, datchk, disk, dpdp3, dpdpfa, dpdpfh, dpdpta, dual, dualex, dualfa, dualfh, dualta, dualtx, dvacalc, enthp, fimpf, flxo, geneq1, geneq2, geneqc, gensdp, gensdp3, gensl1, gensl2, gensl4, gentdp, indpdp, normal, peint, porosi, rdcon, resetv, rlperm, sice, solstore, split, thermc, thermw, thrair, thrmw, user, varchk, vcon, welbor, wrtout
/co2r/	allocmem, cappr, coneql, crdpdp, datchk, disk, dpdp3, dpdpfa, dpdpfh, dpdpta, dual, dualex, dualfa, dualfh, dualta, dualtx, dvacalc, enthp, fimpf, flxo, geneq1, geneq2, geneqc, gensdp, gensdp3, gensl1, gensl2, gensl4, gentdp, indpdp, normal, peint, porosi, rdcon, resetv, rlperm, sice, solstore, split, thermc, thermw, thrair, thrmw, user, varchk, vcon, welbor, wrtout
/coeff/	airctr, cappr, co2ctr, data, enthp, fprop, outbnd, peint, permp, porosi, psat, psatl, sice, split, sther, thermw, thrair, thrmw, varchk, vcon, welbor
/coeff1/	airctr, cappr, co2ctr, data, enthp, fprop, outbnd, peint, permp, porosi, psat, psatl, sice, split, sther, thermw, thrair, thrmw, varchk, vcon, welbor
/coeff2/	airctr, allocmem, cappr, co2ctr, enthp, fprop, outbnd, peint, permp, porosi, psat, psatl, split, thermw, thrair, thrmw, varchk, vcon, welbor
/coeffr/	airctr, allocmem, cappr, co2ctr, enthp, fprop, outbnd, peint, permp, porosi, sice, split, thrair, thrmw, varchk, vcon
/comrxnb/ /david1/	csolve, dpdpta, dualta, gencon, gentdp, node_rxn airctr, allocmem, co2ctr, coneql, crdpdp, ctdpdp, dpdpfa, dpdpfh, dpdpta, dualfa, dualfh, dvacalc, fehmn, flxo, geneq1, geneq2, geneq3, geneqc, normal, split, thrair, varchk, wrtout
/david2/	airctr, co2ctr, coneql, crdpdp, ctdpdp, data, datchk, dpdp3, dpdpfa, dpdpfh, dpdpta, dualfa, dualfh, dvacalc, fehmn, flxo, gencon, geneq1, geneq2, geneq3, geneqc, gensdp, gensdp3, gensl1, gensl2, gensl3, gensl4, gentdp, indpdp, input, normal, setord, split, startup, thrair, varchk, wrtout
/dispersi/	coneql, csolve, data, diskc, dpdpta, dualta, gencon, gentdp, input, mult_rxn, node_rxn, plotcl, rdcon, read_rxn, rxn_prod, setup_rx, solstore, thermc, thermw, thrair, thrmw
/dualp/	co2ctr, crdpdp, data, dpdp3, dpdpfa, dpdpfh, dpdpta,

```

/faay/      airctr, avs_io, co2ctr, contr, contrc, datchk, disk,
            split, termio, writeio, wrtcon, wrtout
/fbb/      airctr, anonp, avs_io, bcon, bnsver, cappr, cnsver,
            co2ctr, concen, coneql, contr, contrc, contrj, crdpdp,
            data, datchk, disk, diskc, dpdp3, dpdpfa, dpdpfh,
            dpdpta, drill, dual, dualx, dualfa, dualfh, dualta,
            dualtx, dvacalc, film, fimpf, flxo, gencof, gencon,
            gendat, geneq1, geneq2, geneq3, geneqc, gensdp,
            gensdp3, gensl1, gensl2, gensl3, gensl4, gentdp,
            gncf2, gncf3, heatb, htcchg, incoord, indpdp, inflo2,
            inflow, initdata, inmentat, inpatran, mult_rxn, near3,
            nearn, normal, peint, permp, plot, plotcl, porosi,
            radius, rarng, rdcon, rddpdp, rlperm, rock, setord,
            setzone, sfn2r, sfn3r, shap2r, shap3p, shap3r, shap3t,
            sice, split, startup, steady, storsx, thermc, thermw,
            thrair, thrmw, user, vcon, veloc, vfcal, welbor,
            wrtcon, wrtout, zone
/fbc/      airctr, anonp, avs_io, bcon, bnsver, cappr, cnsver,
            co2ctr, concen, coneql, contr, contrc, contrj, crdpdp,
            data, datchk, disk, diskc, dpdp3, dpdpfa, dpdpfh,
            dpdpta, drill, dual, dualx, dualfa, dualfh, dualta,
            dualtx, dvacalc, film, fimpf, flxo, gencof, gencon,
            gendat, geneq1, geneq2, geneq3, geneqc, gensdp,
            gensdp3, gensl1, gensl2, gensl3, gensl4, gentdp,
            gncf2, gncf3, heatb, htcchg, incoord, inctrl, indpdp,
            inflo2, inflow, initdata, inmentat, inpatran,
            mult_rxn, near3, nearn, normal, peint, permp, plot,
            plotcl, porosi, radius, rarng, rdcon, rddpdp, rlperm,
            rock, setord, setzone, sfn2r, sfn3r, shap2r, shap3p,
            shap3r, shap3t, sice, split, startup, steady, storsx,
            thermc, thermw, thrair, thrmw, user, vcon, veloc,
            vfcal, welbor, wrtcon, wrtout, zone
/fbs/      airctr, anonp, avs_io, bcon, bnsver, cappr, cnsver,
            co2ctr, concen, coneql, contr, contrc, contrj, crdpdp,
            data, datchk, disk, diskc, dpdp3, dpdpfa, dpdpfh,
            dpdpta, drill, dual, dualx, dualfa, dualfh, dualta,
            dualtx, dvacalc, film, fimpf, flxo, gencof, gencon,
            gendat, geneq1, geneq2, geneq3, geneqc, gensdp,
            gensdp3, gensl1, gensl2, gensl3, gensl4, gentdp,
            gncf2, gncf3, heatb, htcchg, incoord, inctrl, indpdp,
            inflo2, inflow, initdata, inmentat, inpatran, mult_rxn,
            near3, nearn, normal, peint, permp, plot, plotcl,
            porosi, radius, rarng, rdcon, rddpdp, rlperm, rock,
            setord, setzone, sfn2r, sfn3r, shap2r, shap3p, shap3r,
            shap3t, sice, split, startup, steady, storsx, thermc,
            thermw, thrair, thrmw, user, vcon, veloc, vfcal,
            welbor, wrtcon, wrtout, zone
/fcc/      airctr, anonp, avs_io, bcon, cappr, co2ctr, concen,
            coneql, contrj, crdpdp, csolve, data, dpdp3, dpdpfa,
            dpdpfh, dpdpta, drill, dual, dualfa, dualfh, dualta,
            dvacalc, fehmn, film, fimpf, flxo, gencof, gencon,
            gendat, geneq1, geneq2, geneq3, geneqc, gensdp, gensl1,
            gensl2, gensl3, gensl4, gentdp, gncf2, gncf3, heatb,
            indpdp, intime, mult_rxn, normal, peint, permp, plotcl,

```

```

indpdp, inflo2, inflow, inhflx, innode, inperm, inpres,
inrock, intime, mult_rxn, node_rxn, normal, outbnd,
peint, permp, plot, plotcl, rarng, rdcon, read_rxn,
resetttrc, resetv, rlperm, rock, rxn_prod, scanin,
setparam, setup_rx, sice, solstore, split, startup,
steady, sther, thermc, thermw, thrair, thrmwc, timcrl,
user, varchk, vcon, veloc, vfcal, welbor, wrtcon,
wrtout
/fdd2r/
airctr, allocmem, anonp, avs_io, bcon, bnsver, cappr,
cnsver, co2ctr, concen, coneql, contr, contrc, contrj,
crdpdp, csolve, ctdpdp, datchk, disk, diskc, dpdp,
dpdp3, dpdpfa, dpdpfh, dpdpta, drill, dual, dualx,
dualfa, dualfh, dualta, dualtx, dvacalc, enthp, fehmn,
film, fimpf, flxo, fprop, gencof, gencon, geneql,
geneq2, geneq3, geneqc, gensdp, gensdp3, gensl1,
gensl2, gensl3, gensl4, gentdp, gncf2, gncf3, heatb,
incond, indpdp, inflo2, inflow, inhflx, innode, inperm,
inpres, inrock, intime, mult_rxn, node_rxn, normal,
outbnd, peint, permp, plot, plotcl, rarng, rdcon,
read_rxn, resetttrc, resetv, rlperm, rock, rxn_prod,
scanin, setparam, setup_rx, sice, solstore, split,
startup, steady, sther, thermc, thermw, thrair, thrmwc,
timcrl, user, varchk, vcon, veloc, vfcal, welbor,
wrtcon, wrtout
/fddi/
airctr, anonp, avs_io, bcon, bnsver, cappr, cnsver,
co2ctr, concen, coneql, contr, contrc, contrj, crdpdp,
csolve, ctdpdp, data, datchk, disk, diskc, dpdp, dpdp3,
dpdpfa, dpdpfh, dpdpta, drill, dual, dualx, dualfa,
dualfh, dualta, dualtx, dvacalc, enthp, fehmn, film,
fimpf, flxo, fprop, gencof, gencon, geneql, geneq2,
geneq3, geneqc, gensdp, gensdp3, gensl1, gensl2,
gensl3, gensl4, gentdp, gncf2, gncf3, heatb, incond,
indpdp, inflo2, inflow, inhflx, innode, inperm, inpres,
inrock, intime, mult_rxn, node_rxn, normal, outbnd,
peint, permp, plot, plotcl, porosi, rarng, rdcon,
read_rxn, resetttrc, resetv, rlperm, rock, rxn_prod,
scanin, setparam, setup_rx, sice, solstore, split,
startup, steady, sther, thermc, thermw, thrair, thrmwc,
timcrl, user, varchk, vcon, veloc, vfcal, welbor,
wrtcon, wrtout
/fddi1/
airctr, anonp, avs_io, bcon, bnsver, cnsver, co2ctr,
concen, coneql, contr, contrc, contrj, crdpdp, csolve,
ctdpdp, data, datchk, disk, diskc, dpdp, dpdp3, dpdpfa,
dpdpfh, dpdpta, drill, dual, dualfa, dualfh, dualta,
dualtx, dvacalc, enthp, fehmn, film, fimpf, flxo,
fprop, gencof, gencon, geneql, geneq2, geneq3, geneqc,
gensdp, gensdp3, gensl1, gensl2, gensl3, gensl4,
gentdp, gncf2, gncf3, heatb, incond, indpdp, inflo2,
inflow, inhflx, innode, inperm, inrock, intime,
mult_rxn, node_rxn, normal, outbnd, peint, permp, plot,
plotcl, porosi, rarng, read_rxn, resetttrc, resetv, rock,
rxn_prod, scanin, setparam, setup_rx, sice, solstore,
split, startup, steady, sther, thermc, thermw, thrair,
thrmwc, timcrl, user, varchk, vcon, veloc, vfcal,

```

```

gensl2, gensl3, gensl4, gentdp, gncf2, gncf3, heatb,
incond, indpdp, inflo2, inflow, inhflx, innode, inperm,
inpres, inrock, intime, mult_rxn, node_rxn, normal,
outbnd, peint, permp, plot, plotcl, porosi, rarng,
rdcon, read_rxn, resettrc, resetv, rlperm, rock,
rxn_prod, scanin, setparam, setup_rx, solstore, split,
startup, steady, sther, thermc, thermw, thrair, timcrl,
user, vcon, veloc, vfcal, welbor, wrtcon, wrtout
/fii/   airctr, anonp, bnsrwer, cappr, co2ctr, coneql, crdpdp,
data, dpdp3, dpdpfa, dpdpfh, dpdpta, dual, dualx,
dualfa, dualfh, dualta, dualtx, dvacalc, fehmn, flxo,
gencof, gencon, geneq1, geneq2, geneq3, geneqc, gensdp,
gensdp3, gensl1, gensl2, gensl3, gensl4, gentdp,
gncf2, gncf3, indpdp, normal, permp, porosi, renum,
rlperm, sice, split, startup, thermw, thrair, thrmw,
varchk, vcon, welbor, wrtout
/henry/ allocmem, coneql, diskc, dpdpta, dualta, gencon,
gentdp, node_rxn, plotcl, rxn_prod, thermw, thrair,
thrmw
/iice/   airctr, anonp, avs_io, bcon, bnsrwer, cappr, cnsrwer,
co2ctr, concen, coneql, contr, contrc, contrj, crdpdp,
csolve, ctdpdp, data, datchk, disk, diskc, dpdp, dpdp3,
dpdpfa, dpdpfh, dpdpta, drill, dual, dualx, dualfa,
dualfh, dualta, dualtx, dvacalc, enthp, fehmn, film,
fimpf, flxo, fprop, gencof, gencon, geneq1, geneq2,
geneq3, geneqc, gensdp, gensdp3, gensl1, gensl2,
gensl3, gensl4, gentdp, gncf2, gncf3, heatb, incond,
indpdp, inflo2, inflow, inhflx, innode, inperm, inpres,
inrock, intime, mult_rxn, node_rxn, normal, outbnd,
peint, permp, plot, plotcl, porosi, rarng, rdcon,
read_rxn, resettrc, resetv, rlperm, rock, rxn_prod,
scanin, setparam, setup_rx, sice, solstore, split,
startup, steady, sther, thermc, thermw, thrair, thrmw,
timcrl, user, varchk, vcon, veloc, vfcal, welbor,
wrtcon, wrtout
/it/     coneql, csolve, dpdp3, dpdpfa, dpdpfh, dpdpta, dualfa,
dualfh, dualta, gencon, geneq1, geneq2, geneq3, geneqc,
gentdp
/macro/   airctr, allocmem, anonp, avs_io, bcon, bnsrwer,
close_fi, cnsrwer, cntlin, cntlio, coeffc, concen,
coneql, contr, contrc, contrj, crdpdp, csolve, ctdpdp,
datchk, disk, diskc, dpdp, dpdp3, dpdpfa, dpdpfh,
dpdpta, drill, dualx, dualfa, dualfh, dualta, dualtx,
dvacalc, enthp, fehmn, film, fimpf, flxo, fprop,
gencof, gencon, gendat, geneq1, geneq2, geneq3, geneqc,
gensdp, gensdp3, gensl1, gensl2, gensl3, gensl4,
gentdp, geoin, gncf2, gncf3, heatb, incoord, indpdp,
infiles, inflo2, inmentat, innode, inpatran, input,
intime, iofile, mult_rxn, near3, nearn, node_rxn,
normal, outbnd, peint, permp, plot, plotcl, psat,
psatl, radius, rarng, read_rxn, resettrc, resetv, rock,
scanin, setord, setparam, setunits, setzone, shap2r,
shap3p, shap3r, shap3t, solstore, split, startup,
steady, sther, storsx, termin, termio, thermc, thermw,

```

```

171      RDOF_DP2   SOLVE2 is called with too few arguments (30,
                        not 31)
119      RDOF_DP2A SOLVE2 is called with too few arguments (30,
                        not 31)
191      RDOF_DP3   SOLVE3 is called with too few arguments (30,
                        not 31)
3639     SICE       Constant or expression passed to argument #1
                        of SHER, which modifies it
329      SOLVE_NEW  Argument #2 to CONSTANT_VALUE has the wrong
                        type
3077     STARTUP    Argument #2 to PLOT has the wrong type
3077     STARTUP    Argument #3 to PLOT has the wrong type
335      SUB_GMRES1 Argument #2 to CONSTANT_VALUE has the wrong
                        type
356      SUB_GMRES2 Argument #2 to CONSTANT_VALUE has the wrong
                        type
377      SUB_GMRES3 Argument #2 to CONSTANT_VALUE has the wrong
                        type
416      SUB_GMRES4 Argument #2 to CONSTANT_VALUE has the wrong
                        type

```

6. Local Variable Irregularities

There are several instances of a parameter not being used in a module in which it is declared:

Parameter	Modules not using
conc_min	allocmem, coneql, csolve, data, diskc, dpdpta, dualta, gencon, gentdp, input, node_rxn, plotcl, rdcon, read_rxn, setup_rx, thermc, thermw, thrair, thrmw
gas_cons	allocmem, coneql, data, diskc, dpdpta, dualta, gencon, gentdp, input, node_rxn, plotcl, read_rxn, rxn_prod, setup_rx, thermw, thrair, thrmw
mw_air	allocmem, coneql, csolve, data, diskc, dpdpta, dualta, gencon, gentdp, input, mult_rxn, node_rxn, plotcl, rdcon, read_rxn, rxn_prod, setup_rx, solstore, thermc, thermw
mw_water	allocmem, coneql, data, diskc, dpdpta, dualta, gencon, gentdp, input, node_rxn, plotcl, read_rxn, rxn_prod, setup_rx, thrair
rtol	allocmem, coneql, data, diskc, dpdpta, dualta, gencon, gentdp, input, node_rxn, plotcl, rdcon, read_rxn, rxn_prod, setup_rx, solstore, thermw, thrair, thrmw
temp_con	allocmem, coneql, data, diskc, dpdpta, dualta, gencon, gentdp, input, node_rxn, plotcl, read_rxn, rxn_prod, setup_rx, thermw, thrair, thrmw
tols	rdof_dp2, rdof_dp3, sub_gmre, sub_gmre.

The following parameters are assigned inconsistent values:

max_spec, tols.

dpdpfa	devkb	defined, unused
dpdpfa	enli	defined, unused
dpdpfa	enlkb	defined, unused
dpdpfa	envi	defined, unused
dpdpfa	envkb	defined, unused
dpdpfa	ial	defined, unused
dpdpfa	iau	defined, unused
dpdpfa	jml	defined, unused
dpdpfa	neq2	defined, unused
dpdpfa	sx2t	defined, unused
dpdpfa	thxi	defined, unused
dpdpfa	thyi	defined, unused
dpdpfa	thzi	defined, unused
dpdpfh	ial	defined, unused
dpdpfh	iau	defined, unused
dpdpfh	jml	defined, unused
dpdpfh	neq2	defined, unused
dpdpfh	thxi	defined, unused
dpdpfh	thyi	defined, unused
dpdpfh	thzi	defined, unused
dpdpta	alxi	defined, unused
dpdpta	alyi	defined, unused
dpdpta	alzi	defined, unused
dpdpta	athkb	defined, unused
dpdpta	avxi	defined, unused
dpdpta	avyi	defined, unused
dpdpta	avzi	defined, unused
dpdpta	dfee	defined, unused
dpdpta	isl	defined, unused
dpdpta	jm	defined, unused
dpdpta	neq2	defined, unused
dpdpta	sxld	defined, unused
drill	jal	defined, unused
drill	jstrtl	defined, unused
drill	lstepc	defined, unused
dual	ireturn	possibly undefined
dualex	a1	used, undefined
dualex	a2	used, undefined
dualex	b1	used, undefined
dualex	b2	used, undefined
dualfa	a1	used, undefined
dualfa	a2	used, undefined
dualfa	a3	used, undefined
dualfa	a4	used, undefined
dualfa	b1	used, undefined
dualfa	b2	used, undefined
dualfa	delei	defined, unused
dualfa	delekb	defined, unused
dualfa	deli	defined, unused
dualfa	delkb	defined, unused
dualfa	devei	defined, unused
dualfa	devekb	defined, unused
dualfa	devi	defined, unused
dualfa	devkb	defined, unused

gencon	icode	possibly undefined
geneq1	avxi	defined, unused
geneq1	avyi	defined, unused
geneq1	avzi	defined, unused
geneq1	idg	defined, unused
geneq2	avxi	defined, unused
geneq2	avyi	defined, unused
geneq2	avzi	defined, unused
geneq2	icode	undefined, unused
geneq2	idg	defined, unused
geneq3	dtpaei	defined, unused
geneq3	idg	defined, unused
geneqc	avxi	defined, unused
geneqc	avyi	defined, unused
geneqc	avzi	defined, unused
geneqc	idg	defined, unused
gensdp	icode	possibly undefined
gensdp	nc	possibly undefined
gensdp3	dd	possibly undefined
gensdp3	icode	possibly undefined
gensdp3	inddd	possibly undefined
gensdp3	nc	possibly undefined
gensdp3	ndd	possibly undefined
gensdp3	nrw	possibly undefined
gensdp3	sum6	possibly undefined
gensdp3	vv	possibly undefined
gensl1	icode	possibly undefined
gensl2	icode	possibly undefined
gensl2	ij	defined, unused
gensl3	icode	possibly undefined
gensl4	icode	possibly undefined
gentdp	icode	possibly undefined
gentdp	neqp1	defined, unused
gncf3	indx	possibly undefined
heatb	hbt1	defined, unused
heatb	hbt2	defined, unused
heatb	hbt3	defined, unused
heatb	hbt4	defined, unused
incond	ireturn	possibly undefined
inctrl	ireturn	possibly undefined
inflow	icode	possibly undefined
inflow	ireturn	possibly undefined
inhflx	ireturn	possibly undefined
initdata	icode	possibly undefined
inpatran	ca	defined, unused
inpatran	id1	defined, unused
inpatran	id10	defined, unused
inpatran	id2	defined, unused
inpatran	id3	defined, unused
inpatran	id4	defined, unused
inpatran	id5	defined, unused
inpatran	id6	defined, unused
inpatran	id7	defined, unused
inpatran	id8	defined, unused

rd2dof	iout	unused
rd2dof	irdof	unused
rd2dof	itr	defined, unused
rd2dof	nb	unused
rd3dof	f1	defined, unused
rd3dof	iback	possibly undefined
rd3dof	iout	unused
rd3dof	itr	defined, unused
rdcon	ireturn	possibly undefined
rddpdp	ireturn	possibly undefined
rdof_dp2	a1	used, undefined
rdof_dp2	a2	used, undefined
rdof_dp2	a3	used, undefined
rdof_dp2	a4	used, undefined
rdof_dp2	b1	used, undefined
rdof_dp2	b1	used, undefined
rdof_dp2	b2	used, undefined
rdof_dp2	b2	used, undefined
rdof_dp2	kc	defined, unused
rdof_dp3	b1	used, undefined
rdof_dp3	b2	used, undefined
rdof_dp3	b3	used, undefined
rdof_dp3	kk	defined, unused
renum	ireturn	possibly undefined
rlperm	drvs1	possibly undefined
rlperm	ireturn	possibly undefined
rlperm	rv1	possibly undefined
rxn_prod	mi_subst	unused
scanin	adumm	defined, unused
scanin	cdumm	defined, unused
scanin	idumm	defined, unused
scanin	jb	defined, unused
scanin	jc	defined, unused
shap3t	nga	unused
sice	ireturn	possibly undefined
solstore	danld	defined, unused
solve	iptty	unused
solve	nbnd	unused
solve	nopt	unused
solve2	a1	used, undefined
solve2	a2	used, undefined
solve2	a3	used, undefined
solve2	a4	used, undefined
solve2	iback	unused
solve2	iptty	unused
solve2	nbnd	unused
solve3	a1	used, undefined
solve3	a2	used, undefined
solve3	a3	used, undefined
solve3	a4	used, undefined
solve3	a5	used, undefined
solve3	iback	unused
solve3	iptty	unused
solve3	nbnd	unused

thermw	rl	possibly undefined
thrair	dr1p	defined, unused
thrair	drvp	defined, unused
thrair	ieosd	defined, unused
thrmwc	dalpca	defined, unused
thrmwc	rl	possibly undefined
thrmwc	xn11	defined, unused
timcr1	pravg	possibly undefined
timcr1	tmavg	possibly undefined
tying	dummy	unused
tying	temp	undefined, unused
userc	k	unused
varchk	dpsats	possibly undefined
varchk	dpsatt	possibly undefined
varchk	dtsatp	possibly undefined
vcon	ireturn	possibly undefined
vcon	ivcnd	defined, unused
veloc	hzmax	defined, unused
veloc	neqp1	defined, unused
welbor	ajunk	defined, unused
welbor	ein	defined, unused
welbor	istand	defined, unused
welbor	mq	defined, unused
welbor	secmax	defined, unused
welbor	year	defined, unused
write_av	ioveloci	unused
write_av	maxco	used, undefined
wrtcon	rcdss	defined, unused
zone	icode	possibly undefined
zone	ltest	defined, unused.

7. Fortran Extensions

All routines contain lowercase characters in their active Fortran.

Module "wrtout" calls the "dfloat" intrinsic function.

A potential overlap in a character assignment statement occurs in the modules "cntlin" and "termin".

The following routines use quotation marks (" ") as a string delimiter:

allocmem, anonp, avs_io, cappr, co2ctr, dual, gencof, gencon, gensdp, gensdp3, gensl1, gensl2, gensl3, gensl4, gentdp, inflow, initdata, inpres, porosi, rdcon, rddpdp, rlperm, sice, split, startup, storage_derivatives, thermw, vcon, zone.

The following modules contain unlabeled (do-endo) loops:

airctr, anonp, avs_prefix, avs_write_cord, avs_write_struc, bcon, cnsrwer, cntlin, cntlio, constant_value, contrc, csolve, data, datchk, ddpdp3, dvacalc, equal_array, fehm, file_prefix, fimpf, flxo, gencof,

inpres, input, inrock, intime, mult_rxn, near3, nearn, node_rxn, normal, outbnd, peint, permp, plot, plotcl, porosi, psat, psatl, radius, rarng, rdcon, rddpdp, read_rxn, renum, resetttrc, resetv, rlperm, rock, rxn_product, scanin, setord, setparams, setup_rxn, setzone, sf2r, sf3r, shap2r, shap3p, shap3r, shap3t, sice, solstore, split, startup, steady, sther, storage_derivatives, storsx, thermc, thermw, thrair, thrmwc, timcrl, user, varchk, vcon, veloc, vfcal, welbor, wrtcon, wrtout, zone

The following modules contain "implicit none" declarations:

airctr, allocmem, avs_prefix, bcon, bnsr, cappr, close_files, cnsr, cntlin, cntlio, co2ctr, coeffc, concn, coneql, constant_value, contr, contrc, crdpdp, csolve, ctdpdp, data, datchk, dated, daycrl, determ, diskc, dpdp, dual, dualx, dualfa, dualfh, dualta, dualtx, dvacalc, enthp, equal_array, fehmn, file_prefix, fimpf, gencon, geneq2, gensl2, geoin, incond, incoord, inctrl, indpdp, infiles, inflo2, inflow, inhflx, initdata, inmentat, innode, inpatran, inperm, inpres, input, inrock, intime, iofile, min_max, mmgetblk, mmrelblk, mult_rxn, near3, node_rxn, nopcnr, nopcnv, nrmlz4, null, outbnd, plot, plotcl, porosi, psat, psatl, rdcon, rddpdp, read_rxn, renum, renumber_array, resetttrc, residual, rlperm, rxn_product, scanin, setparams, setunits, setup_rxn, setzone, sf2r, sf3r, sice, slvesu, solstore, solve4, solve_new, startup, steady, sther, storag, storsx, stress, sub_bksubl, sub_bksub4, sub_gmres1, sub_gmres2, sub_gmres3, sub_gmres4, sub_ilu1, sub_ilu4, termin, termio, thermc, thrair, thrmwc, timcrl, tynig, userc, vaporl, varchk, vcon, vgcap, vgrlp, writeio, wrtcon, zeroi_out, zeror_out, zone

Modules "input" and "welbor" contain coding which allows transfer of control into an "elseif" block.

The following routines contain references to identifiers which have names longer than 6 characters:

airctr, allocmem, anonp, avs_io, avs_prefix, avs_write_cord, avs_write_struc, bcon, binghm, bnsr, cappr, casson, close_files, cnsr, cntlin, cntlio, co2ctr, coeffc, concn, coneql, constant_value, contr, contrc, contrj, crdpdp, csolve, ctdpdp, cubic, data, datchk, disk, diskc, dpdp, dpdp3, dpdpfa, dpdpfh, dpdpta, drill, dual, dualx, dualfa, dualfh, dualta, dualtx, dvacalc, elem_type, enthp, equal_array, fehmn, file_prefix, film, fimpf, flxo, fourth, fprop, gencof, gencon, gendat, geneq1, geneq2, geneq3, geneqc, gensdp, gensdp3, gensl1, gensl2, gensl3, gensl4, gentdp, geoin, gncf2, gncf3, heatb, htcchg, incond, incoord, inctrl, indpdp, infiles, inflo2, inflow, inhflx, initdata, inmentat, innode, inpatran, inperm, inpres, input, inrock, intime, iofile, lubksb0, ludcmp0, min_max, mmgetblk, mmrelblk, mult_rxn, namefile2, near3, nearn, newton, node_rxn, normal, normal_uc, outbnd, pebi3, pebiq, peint, permp, plot, plotcl, porosi, power, psat, psatl, qhuser, radius, rarng, rdcon, rddpdp, rdof_dp2, rdof_dp2a, rdof_dp3, read_avs_io, read_rxn, renum, renumber_array, resetttrc, resetv, residual, rlperm, rock, rxn_product, scanin, setord, setparams, setunits, setup_rxn,

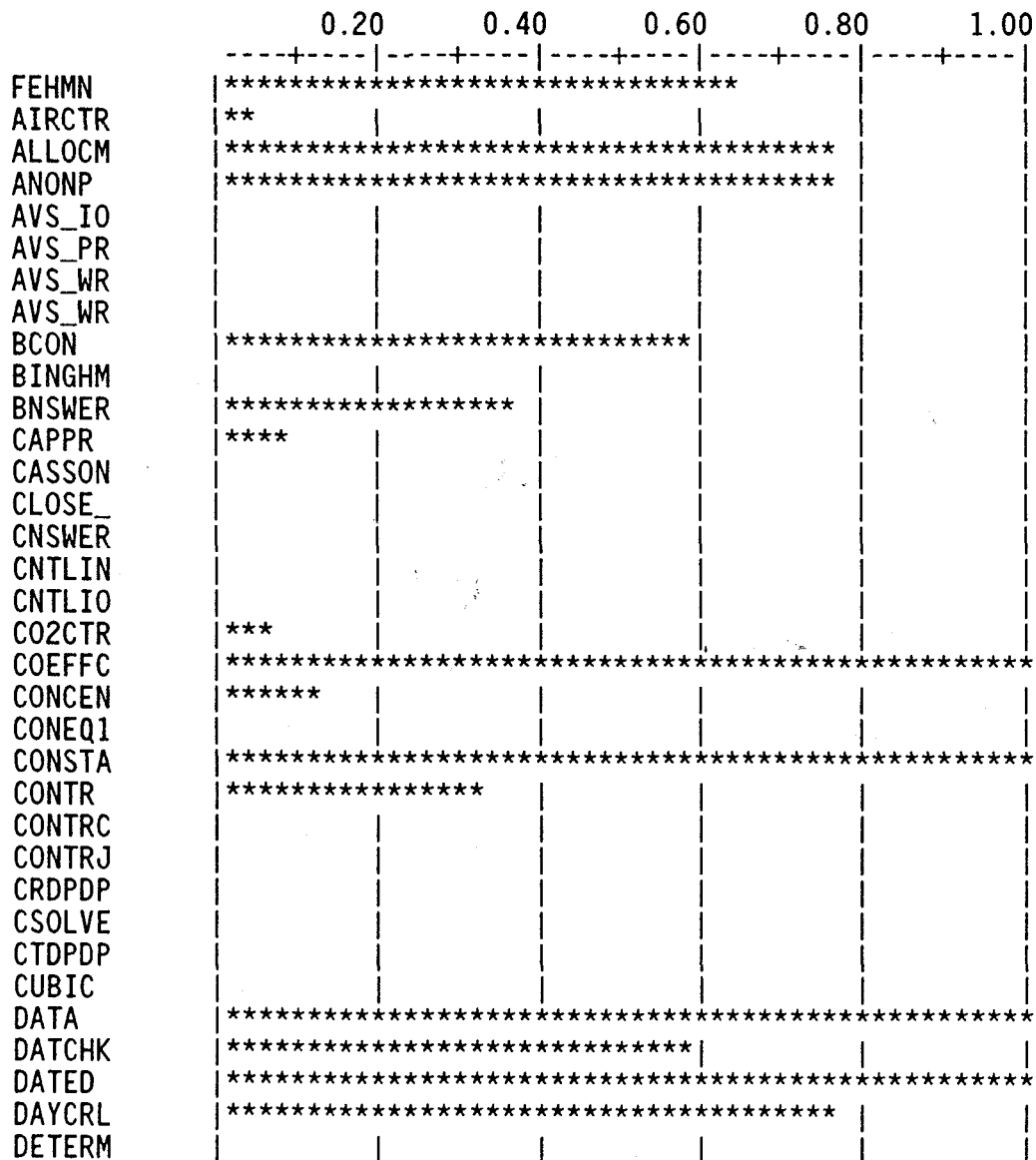
GENSL3	1.005	3.841	77.663	47.61992	0.01	1.161	0.814
SUB_ILU1	0.917	3.506	81.170	87.32684	0.00	1.161	0.490
PLOT	0.818	3.128	84.298	64.91328	0.00	1.295	0.931
RLPERM	0.747	2.855	87.152	5.83374	0.04	2.337	0.035
SUB_GMRES1	0.739	2.825	89.977	91.23481	0.00	0.299	0.081
VARCHK	0.530	2.026	92.003	93.98378	0.09	1.646	0.083
FEHMN	0.435	1.663	93.666	0.08527	0.00	1.852	0.549
MMGETBLK	0.363	1.388	95.054	0.00000	22.58	2.959	1.090
MMRELBLK	0.295	1.128	96.182	0.00000	27.19	3.633	1.042
STORAGE_DERIVATIVES							
	0.253	0.968	97.150	0.01517	0.05	3.938	1.441
ENTHP	0.203	0.777	97.927	0.00000	58.06	1.566	1.101
ZEROR_OUT	0.095	0.364	98.291	0.00000	56.90	0.694	0.796
OUTBND	0.068	0.258	98.550	0.00000	0.18	2.111	0.089
INCOORD	0.048	0.183	98.733	89.89333	0.00	1.315	0.815
WELBOR	0.034	0.132	98.864	0.00000	4.38	1.318	0.857
ANONP	0.021	0.081	98.945	18.17141	0.00	2.831	0.104
BNSWER	0.020	0.075	99.020	0.70805	0.16	1.777	1.322
RESIDUAL	0.019	0.073	99.093	93.43284	2.09	0.562	0.566
RENUMBER_ARRAY	0.017	0.065	99.158	0.00000	4.94	0.538	0.741
GENCOF	0.015	0.058	99.216	21.47727	0.00	2.134	0.232
INPUT	0.015	0.057	99.273	99.43535	0.00	1.882	0.773
CAPPR	0.014	0.053	99.326	0.00000	2.00	1.164	0.783
SOLVE_NEW	0.014	0.053	99.379	0.57266	0.22	1.936	0.958
DATCHK	0.013	0.050	99.429	34.82616	0.00	2.271	1.026
FIMPF	0.012	0.046	99.475	98.03922	0.25	0.403	0.396
SCANIN	0.011	0.044	99.519	98.41166	0.00	1.044	1.021
BCON	0.011	0.041	99.560	90.35714	0.29	0.533	0.564
TYMING	0.009	0.035	99.595	84.20563	3.05	4.468	0.992
DISK	0.008	0.030	99.625	58.74761	0.00	0.306	0.871
INITDATA	0.007	0.028	99.653	88.19855	0.00	1.460	0.715
PEINT	0.007	0.028	99.680	0.39190	0.00	0.087	0.009
TIMCRL	0.006	0.024	99.705	0.35469	0.49	2.389	1.243
NULL	0.006	0.023	99.727	0.00000	0.24	4.290	0.279
EQUAL_ARRAY	0.006	0.022	99.749	0.00000	2.13	0.562	0.625
TERMIN	0.005	0.021	99.770	96.26397	0.00	1.020	0.584
CO2CTR	0.005	0.020	99.790	0.00000	0.59	1.392	0.918
WRTOUT	0.005	0.020	99.810	48.60585	0.00	0.866	0.873
DUAL	0.005	0.020	99.829	0.00000	0.61	1.337	0.828
SICE	0.005	0.019	99.848	0.00000	0.64	1.345	0.869
VCON	0.005	0.019	99.867	0.00000	0.63	1.447	0.867
MIN_MAX	0.004	0.016	99.883	0.00000	7.09	23.852	0.445
CONCEN	0.004	0.015	99.897	0.00000	0.82	1.726	0.954
GNCF3	0.004	0.015	99.912	47.90777	0.01	1.946	0.646
VELOC	0.004	0.014	99.926	0.00000	0.85	1.557	0.992
CONTR	0.003	0.013	99.939	33.10031	0.00	0.965	1.014
CONSTANT_VALUE	0.003	0.010	99.949	0.00000	1.15	0.750	0.678
WRITEIO	0.002	0.008	99.957	100.00000	0.00	1.339	0.548
TERMIO	0.002	0.006	99.963	99.68692	0.00	1.443	0.657
DAYCRL	0.001	0.006	99.969	0.00000	2.06	17.246	1.211
DATED	0.001	0.005	99.974	0.00000	0.00	1.554	0.687
DATA	0.001	0.004	99.978	65.21963	0.00	5.041	1.302
ALLOCMEM	0.001	0.004	99.982	3.95779	0.00	4.723	1.435
IOFILE	0.001	0.004	99.986	71.97081	0.00	1.753	0.787

Fourteen routines achieve 1%-19% coverage, 9 routines achieve 20%-39% coverage, 13 routines achieve 40%-59% coverage, 10 routines achieve 60%-79% coverage, 11 routines achieve 80%-99% coverage, and 23 routines achieve 100% coverage.

Module Name	Number of Segments in module	Number of Segments Executed	Percent Segment Coverage
FEHMN	67	43	64.2
AIRCTR	54	2	3.7
ALLOCM	4	3	75.0
ANONP	145	109	75.2
AVS_IO	140	0	0.0
AVS_PR	9	0	0.0
AVS_WR	7	0	0.0
AVS_WR	7	0	0.0
BCON	17	10	58.8
BINGHM	20	0	0.0
BNSWER	31	11	35.5
CAPPR	24	2	8.3
CASSON	20	0	0.0
CLOSE_	25	0	0.0
CNSWER	20	0	0.0
CNTLIN	30	0	0.0
CNTLIO	24	0	0.0
CO2CTR	73	4	5.5
COEFFC	1	1	100.0
CONCEN	17	2	11.8
CONEQ1	52	0	0.0
CONSTA	5	5	100.0
CONTR	76	25	32.9
CONTRC	33	0	0.0
CONTRJ	14	0	0.0
CRDPDP	27	0	0.0
CSOLVE	134	0	0.0
CTDPDP	3	0	0.0
CUBIC	16	0	0.0
DATA	3	3	100.0
DATCHK	65	38	58.5
DATED	1	1	100.0
DAYCRL	4	3	75.0
DETERM	4	0	0.0
DISK	96	26	27.1
DISKC	20	0	0.0
DPDP	25	2	8.0
DPDP3	43	0	0.0
DPDPFA	37	0	0.0
DPDPFH	36	0	0.0
DPDPTA	34	0	0.0
DRILL	39	0	0.0
DUAL	50	3	6.0
DUALEX	27	0	0.0
DUALFA	52	0	0.0
DUALFH	52	0	0.0
DUALTA	32	0	0.0

MMRELB	1	1	100.0
MULT_R	70	0	0.0
NAMEFI	20	0	0.0
NEAR3	16	0	0.0
NEARN	6	0	0.0
NEWTON	18	0	0.0
NODE_R	12	0	0.0
NOPCNR	51	0	0.0
NOPCNV	43	8	18.6
NORMAL	21	0	0.0
NORMAL	11	0	0.0
NRMLZ4	105	0	0.0
NULL	5	5	100.0
OUTBND	36	5	13.9
PBFLAT	5	0	0.0
PEBI	14	0	0.0
PEBI3	19	0	0.0
PEBIQ	5	0	0.0
PEINT	36	30	83.3
PERMP	68	0	0.0
PLOT	14	12	85.7
PLOT1	9	0	0.0
POROSI	51	2	3.9
POWER	10	0	0.0
PSAT	27	0	0.0
PSATL	31	0	0.0
PSPLIT	48	0	0.0
QHUSER	13	0	0.0
RADIUS	11	0	0.0
RARNG	7	0	0.0
RD1DOF	85	0	0.0
RD2DOF	84	0	0.0
RD3DOF	59	0	0.0
RDCON	88	0	0.0
RDDPDP	1	0	0.0
RDOF_D	27	0	0.0
RDOF_D	16	0	0.0
RDOF_D	16	0	0.0
READ_A	36	0	0.0
READ_R	35	0	0.0
RENUM	1	0	0.0
RENUMB	5	5	100.0
RESETT	5	0	0.0
RESETV	25	0	0.0
RESIDU	7	7	100.0
RLPERM	65	23	35.4
ROCK	27	0	0.0
RXN_PR	4	0	0.0
SCANIN	23	18	78.3
SETORD	28	9	32.1
SETPAR	21	11	52.4
SETUNI	1	1	100.0
SETUP_	67	0	0.0
SETZON	55	0	0.0

VGRLP	6	0	0.0
WELBOR	263	3	1.1
WRITE_	12	0	0.0
WRITE_	5	0	0.0
WRITE_	74	0	0.0
WRITE_	21	0	0.0
WRITE_	1	0	0.0
WRITEI	1	1	100.0
WRTCON	31	0	0.0
WRTOUT	119	43	36.1
ZEROI_	3	3	100.0
ZEROR_	3	3	100.0
ZONE	44	0	0.0
Totals	8039	1187	14.8



INPATR				
INPERM	*****			
INPRES				
INPUT	*****			
INROCK	*****			
INTIME	*****			
IOFILE	*****			
LUBKSB				
LUBKSB				
LUDCMP				
LUDCMP				
MIN_MA	*****			
MMGETB	*****			
MMRELB	*****			
MULT_R				
NAMEFI				
NEAR3				
NEARN				
NEWTON				
NODE_R				
NOPCNR				
NOPCNV	*****			
NORMAL				
NORMAL				
NRMLZ4				
NULL	*****			
OUTBND	*****			
PBFLAT				
PEBI				
PEBI3				
PEBIQ				
PEINT	*****			
PERMP				
PLOT	*****			
PLOTCT				
POROSI	**			
POWER				
PSAT				
PSATL				
PSPLIT				
QHUSER				
RADIUS				
RARNG				
RD1DOF				
RD2DOF				
RD3DOF				
RDCON				
RDDPDP				
RDOF_D				
RDOF_D				
RDOF_D				
READ_A				
READ_R				
RENUM				

THERMW	*****			
THRAIR				
THRMWC				
TIMCRL	*****			
TYMING	*****			
USER				
USERC				
VAPORL				
VARCHK	*****			
VCON	*****			
VELOC	**			
VFCAL				
VGCAP				
VGRLP				
WELBOR	*			
WRITE_				
WRITE_				
WRITE_				
WRITE_				
WRITE_				
WRITEI	*****			
WRTCON				
WRTOUT	*****			
ZEROI_	*****			
ZEROR_	*****			
ZONE				
	-----	-----	-----	-----

coverage = 0.

AVS_IO	AVS_PR	AVS_WR	AVS_WR	BINGHM
CASSON	CLOSE_	CNSWER	CNTLIN	CNTLIO
CONEQ1	CONTRC	CONTRJ	CRDPDP	CSOLVE
CTDPDP	CUBIC	DETERM	DISKC	DPDP3
DPDPFA	DPDPFH	DPDPTA	DRILL	DUALEX
DUALFA	DUALFH	DUALTA	DUALTX	DVACAL
ELEM_T	FILM	FOURTH	FPROP	GENCON
GENDAT	GENEQ1	GENEQ2	GENEQC	GENSDP
GENSDP	GENSL1	GENSL2	GENSL4	GENTDP
GEOIN	GNCF2	HEATB	HTCCHG	INDPDP
INFLO2	INHFLX	INMENT	INPATR	INPRES
LUBKSB	LUBKSB	LUDCMP	LUDCMP	MULT_R
NAMEFI	NEAR3	NEARN	NEWTON	NODE_R
NOPCNR	NORMAL	NORMAL	NRMLZ4	PBFLAT
PEBI	PEBI3	PEBIQ	PERMP	PLOTCL
POWER	PSAT	PSATL	PSPLIT	QHUSER
RADIUS	RARNG	RD1DOF	RD2DOF	RD3DOF
RDCON	RDDPDP	RDOF_D	RDOF_D	RDOF_D
READ_A	READ_R	RENUM	RESETT	RESETV
ROCK	RXN_PR	SETUP_	SETZON	SFN2R
SFN3R	SHAP2R	SHAP3P	SHAP3T	SOLSTO
SOLVE	SOLVE2	SOLVE3	SOLVE4	SOLVEN
SPLIT	STEADY	STHER	STORSX	SUB_BK

those most likely to have defects. As a guideline, normalized measures of 15 or greater should be considered complex. A software maintenance program should focus on those routines with the highest measures.

FEHMN Analysis

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DPDP	1682	32	1313	1290	4031.3	40.6	0	0.0	0	0.0	3	9.4	0	0.0	1
DPDP3	3805	456	2582	2489	545.8	4.8	0	0.0	0	0.0	5	1.1	12	2.6	19
DPDPFA	3540	230	2565	2486	1080.9	7.8	0	0.0	0	0.0	3	1.3	11	4.8	7
DPDPFH	3567	260	2562	2484	955.4	6.9	0	0.0	0	0.0	3	1.2	11	4.2	9
DPDPTA	3955	207	2919	2830	1367.1	8.7	0	0.0	0	0.0	3	1.4	10	4.8	6
DRILL	2225	130	1537	1482	1140.0	13.8	0	0.0	6	4.6	9	6.9	2	1.5	3
DUAL	3589	131	2723	2626	2004.6	18.3	0	0.0	1	0.8	16	12.2	2	1.5	3
DUALEX	2870	62	2183	2134	3441.9	22.6	0	0.0	0	0.0	9	14.5	2	3.2	1
DUALFA	4518	452	3143	3026	669.5	5.8	0	0.0	0	0.0	6	1.3	18	4.0	11
DUALFH	4586	554	3083	2961	534.5	4.7	0	0.0	0	0.0	6	1.1	18	3.2	16
DUALTA	4478	365	3177	3051	835.9	5.5	0	0.0	0	0.0	6	1.6	8	2.2	9
DUALTX	2739	11	2112	2069	18809.1	18.2	0	0.0	0	0.0	0	0.0	0	0.0	0
DVACALC	3252	23	2498	2454	10669.6	17.4	0	0.0	0	0.0	2	8.7	0	0.0	1
ELEM_TYPE	77	33	42	28	84.8	18.2	0	0.0	1	3.0	4	12.1	0	0.0	1
ENTHP	2201	47	1649	1627	3461.7	10.6	0	0.0	0	0.0	2	4.3	0	0.0	1
EQUAL_ARRAY	154	7	144	142	2028.6	42.9	0	0.0	0	0.0	0	0.0	0	0.0	0
FILE_PREFIX	160	11	157	153	1390.9	45.5	0	0.0	2	18.2	0	0.0	2	18.2	0
FILM	2232	139	1556	1495	1075.5	23.0	0	0.0	3	2.2	18	12.9	5	3.6	2
FIMPF	2499	16	1882	1854	11587.5	43.7	0	0.0	0	0.0	2	12.5	0	0.0	0
FLXO	2980	142	2169	2124	1495.8	35.9	0	0.0	0	0.0	10	7.0	4	2.8	4
FOURTH	217	21	195	189	900.0	19.0	0	0.0	2	9.5	0	0.0	3	14.3	0
FPROP	1846	117	1356	1309	1118.8	16.2	0	0.0	0	0.0	6	5.1	6	5.1	2
GENCOF	2577	125	1855	1795	1436.0	28.0	0	0.0	0	0.0	14	11.2	4	3.2	3
GENCON	3854	90	2956	2898	3220.0	21.1	0	0.0	0	0.0	11	12.2	0	0.0	3
GENDAT	1314	23	1117	1089	4734.8	26.1	0	0.0	0	0.0	1	4.3	0	0.0	1
GENEQ1	3632	335	2539	2466	736.1	8.7	0	0.0	0	0.0	5	1.5	10	3.0	11
GENEQ2	3997	439	2755	2672	608.7	10.7	0	0.0	0	0.0	7	1.6	20	4.6	15
GENEQ3	2843	88	2123	2075	2358.0	11.4	0	0.0	0	0.0	3	3.4	0	0.0	3
GENEQC	3628	522	2397	2315	443.5	7.3	0	0.0	0	0.0	8	1.5	12	2.3	23
GENSDP	3264	135	2399	2322	1720.0	20.0	0	0.0	1	0.7	10	7.4	4	3.0	4
GENSDP3	3278	156	2400	2325	1490.4	15.4	0	0.0	1	0.6	9	5.8	4	2.6	5
GENSL1	3188	77	2357	2304	2992.2	20.8	0	0.0	1	1.3	3	3.9	8	10.4	3
GENSL2	3586	164	2661	2600	1585.4	20.1	0	0.0	0	0.0	11	6.7	9	5.5	6
GENSL3	2667	74	1974	1937	2617.6	18.9	0	0.0	1	1.4	2	2.7	4	5.4	3
GENSL4	3193	79	2373	2317	2932.9	20.3	0	0.0	1	1.3	3	3.8	8	10.1	3
GENTDP	3878	102	2892	2811	2755.9	20.6	0	0.0	0	0.0	9	8.8	3	2.9	3
GEOIN	631	14	567	559	3992.9	35.7	0	0.0	0	0.0	2	14.3	0	0.0	0
GNCF2	2531	251	1717	1669	664.9	24.3	0	0.0	3	1.2	25	10.0	0	0.0	6
GNCF3	2968	650	1738	1688	259.7	13.2	0	0.0	4	0.6	24	3.7	0	0.0	33
HEATB	2096	62	1504	1479	2385.5	33.9	0	0.0	0	0.0	11	17.7	4	6.5	1
HTCCHG	578	67	412	402	600.0	26.9	0	0.0	0	0.0	8	11.9	0	0.0	1
INCOND	1700	17	1311	1291	7594.1	11.8	0	0.0	0	0.0	0	0.0	0	0.0	0

FEHMN Analysis

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PERMP	2666	131	1930	1875	1431.3	22.1	2	1.5	14	10.7	5	3.8	16	12.2	4
PLOT	1913	26	1445	1425	5480.8	26.9	0	0.0	0	0.0	4	15.4	0	0.0	1
PLOT01	2485	15	1862	1836	12240.0	26.7	0	0.0	0	0.0	3	20.0	0	0.0	0
POROSI	3498	117	2649	2587	2211.1	17.1	0	0.0	0	0.0	12	10.3	0	0.0	3
POWER	267	41	214	205	500.0	12.2	0	0.0	1	2.4	0	0.0	4	9.8	1
PSAT	1338	71	1140	1120	1577.5	16.9	0	0.0	2	2.8	6	8.5	2	2.8	1
PSATL	1295	85	1082	1059	1245.9	16.5	0	0.0	2	2.4	8	9.4	2	2.4	2
PSPLIT	540	89	23	14	15.7	33.7	0	0.0	2	2.2	10	11.2	2	2.2	2
QHUSER	214	16	196	191	1193.7	50.0	0	0.0	0	0.0	3	18.7	1	6.2	0
RADIUS	970	25	800	781	3124.0	20.0	0	0.0	1	4.0	1	4.0	1	4.0	0
RARNG	1690	13	1252	1232	9476.9	53.8	0	0.0	0	0.0	2	15.4	0	0.0	0
RD1DOF	300	184	112	42	22.8	21.2	0	0.0	1	0.5	11	6.0	2	1.1	4
RD2DOF	382	255	113	42	16.5	14.9	0	0.0	0	0.0	2	0.8	1	0.4	7
RD3DOF	325	202	76	23	11.4	13.9	0	0.0	0	0.0	4	2.0	1	0.5	7
RDCON	3701	216	2759	2579	1194.0	19.0	0	0.0	3	1.4	21	9.7	1	0.5	5
RDDPDP	1485	14	1267	1240	8857.1	7.1	0	0.0	0	0.0	0	0.0	0	0.0	0
RDOF_DP2	195	141	44	23	16.3	9.9	0	0.0	0	0.0	0	0.0	0	0.0	6
RDOF_DP2A	169	114	38	17	14.9	7.0	0	0.0	0	0.0	0	0.0	0	0.0	4
RDOF_DP3	296	234	37	16	6.8	3.4	0	0.0	0	0.0	0	0.0	0	0.0	8
READ_AVS_IO	171	80	66	35	43.7	23.7	0	0.0	1	1.2	3	3.7	1	1.2	2
READ_RXN	2152	57	1656	1594	2796.5	36.8	0	0.0	0	0.0	5	8.8	1	1.8	1
RENUM	1147	8	1025	1004	12550.0	12.5	0	0.0	0	0.0	0	0.0	0	0.0	0
RENUMBER_ARR	156	7	146	144	2057.1	42.9	0	0.0	0	0.0	0	0.0	0	0.0	0
RESETTRC	1863	12	1509	1492	12433.3	25.0	0	0.0	0	0.0	0	0.0	0	0.0	0
RESETV	1708	40	1237	1212	3030.0	30.0	0	0.0	0	0.0	4	10.0	0	0.0	1
RESIDUAL	165	11	151	149	1354.5	36.4	0	0.0	0	0.0	1	9.1	0	0.0	0
RLPERM	3536	208	2551	2502	1202.9	13.0	0	0.0	1	0.5	17	8.2	1	0.5	5
ROCK	1766	49	1275	1246	2542.9	32.7	0	0.0	0	0.0	8	16.3	3	6.1	1
RXN_PRODUCT	1418	14	997	985	7035.7	14.3	0	0.0	0	0.0	1	7.1	0	0.0	0
SCANIN	1605	36	1218	1202	3338.9	27.8	0	0.0	5	13.9	1	2.8	2	5.6	1
SETORD	1526	89	1179	1154	1296.6	16.9	0	0.0	0	0.0	3	3.4	2	2.2	1
SETPARAMS	1726	71	1292	1276	1797.2	12.7	0	0.0	1	1.4	5	7.0	1	1.4	1
SETUNITS	613	14	536	528	3771.4	7.1	0	0.0	0	0.0	0	0.0	0	0.0	0
SETUP_RXN	1624	113	1115	1103	976.1	23.9	0	0.0	0	0.0	10	8.8	0	0.0	2
SETZONE	1462	179	1125	1109	619.6	19.0	0	0.0	2	1.1	9	5.0	6	3.4	4
SFN2R	682	15	578	565	3766.7	13.3	0	0.0	0	0.0	0	0.0	0	0.0	0
SFN3R	707	32	592	580	1812.5	6.2	0	0.0	0	0.0	0	0.0	0	0.0	1
SHAP2R	1310	24	1047	1026	4275.0	12.5	0	0.0	0	0.0	1	4.2	0	0.0	1
SHAP3P	1325	45	1041	1023	2273.3	2.2	0	0.0	0	0.0	0	0.0	0	0.0	2
SHAP3R	1328	42	1046	1026	2442.9	7.1	0	0.0	0	0.0	1	2.4	0	0.0	1
SHAP3T	1309	24	1036	1015	4229.2	8.3	0	0.0	0	0.0	0	0.0	0	0.0	1
SICE	3360	61	2591	2527	4142.6	14.8	0	0.0	0	0.0	5	8.2	1	1.6	1

FEHMN Analysis

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VARCHK	3477	213	2593	2501	1174.2	18.3	0	0.0	0	0.0	24	11.3	3	1.4	4
VCON	3344	50	2589	2536	5072.0	16.0	0	0.0	2	4.0	4	8.0	1	2.0	1
VELOC	2164	120	1517	1475	1229.2	17.5	0	0.0	0	0.0	18	15.0	0	0.0	3
VFCAL	1710	30	1250	1229	4096.7	20.0	0	0.0	0	0.0	1	3.3	4	13.3	1
VGCAP	252	32	192	192	600.0	21.9	0	0.0	0	0.0	2	6.2	0	0.0	1
VGRLP	237	29	253	253	872.4	13.8	0	0.0	0	0.0	1	3.4	0	0.0	0
WELBOR	3423	602	2181	2098	348.5	17.4	1	0.2	55	9.1	14	2.3	60	10.0	10
WRITE_AVS_NC	85	23	15	13	56.5	21.7	0	0.0	0	0.0	2	8.7	0	0.0	1
WRITE_AVS_NM	66	9	16	15	166.7	33.3	0	0.0	0	0.0	0	0.0	0	0.0	0
WRITE_AVS_NS	224	157	46	38	24.2	24.8	0	0.0	0	0.0	13	8.3	0	0.0	2
WRITE_AVS_NV	82	41	22	15	36.6	19.5	0	0.0	0	0.0	4	9.8	0	0.0	1
WRITE_AVS_UC	77	23	26	21	91.3	4.3	0	0.0	0	0.0	0	0.0	0	0.0	0
WRITEIO	796	2	690	678	33900.0	50.0	0	0.0	0	0.0	0	0.0	0	0.0	0
WRTCON	2322	61	1779	1743	2857.4	29.5	0	0.0	0	0.0	9	14.8	2	3.3	1
WRTOUT	3231	183	2365	2272	1241.5	33.9	0	0.0	1	0.5	13	7.1	40	21.9	5
ZEROI_OUT	8	5	9	9	180.0	40.0	0	0.0	0	0.0	0	0.0	0	0.0	0
ZEROR_OUT	8	5	0	0	0.0	40.0	0	0.0	0	0.0	0	0.0	0	0.0	0
ZONE	1335	97	1079	1063	1095.9	21.6	0	0.0	5	5.2	9	9.3	2	2.1	0

Legend of Metrics in Report

loc -- lines of code
 sloc -- number of executable statements
 cmnt -- total number of comments
 ncomt -- number of non-blank COMMENT statements
 100*ncomt/sloc -- percent, nonblank comments to number of executable statements
 100*vg2/sloc -- percent, extended complexity of number of executable statements
 cgoto -- number of COMPUTED GO TO statements
 100*cgoto/sloc -- percent, computed GOTO's to number of executable statements
 ugoto -- number of UNCONDITIONAL GO TO statements
 100*ugoto/sloc -- percent, unconditional GOTO's to number of executable statements
 bIF -- number of BLOCK IF statements
 100*bif/sloc -- percent, Block IF statements to number of executable statements
 lIF -- number of LOGICAL IF statements
 100*lif/sloc -- percent, logical IF statements to number of executable statements
 Bhat -- Halstead's predicted number of errors in writing code