

PLTEMP/ANL 4.0 Input File Listings

Question 4.15

Eight input files were used, one for each of eight flow rates as follows:

For 1000 gpm: "R:\Rhode_Island\SAR_update\PLTEMP_Forced-Flow_July2010\RI_1000gpm_01.inp"

```
! Rhode Island, equilibrium core, 1 internal plate (LEU)
RINSC, 88 mil channel, 1 internal plate; 1580 gpm
1 0 0 1 0 1 0 0 0 0 0 0 0 2 1 1 0 0 0100
1. 1.2 00200
5 7.5e-3 3.0e-1 1. 1.0 0201
1 3 0. 1. 1. 1. 0 0 0203
1.24 1.28 1.23 30300-1
1 2 1. 0300A-1
1 1 1 0301-1
1.32483 0302-1
1. 1. 0. 0. 0.066548 0.0022352 0303-1
1. 1. 0.59055 0. 0.066548 0.0022352 0304-1
1. 1. 0. 0. 0.066548 0.0022352 0304-1
0. 0. 0. 0.066548 0.0022352 0305-1
! channel length (fueled portion)=23.25"=0.59055 m, total width=2.62"=0.066548 m,
! and thickness=0.088"=0.0022352 m
! plate fueled width=2.395"
! channel unfueled width (each side)=(2.62"-2.395")/2=0.1125"=2.8575e-3 m
! clad thickness =0.015"=3.81e-4 m; meat thickness=0.020"=5.08e-4 m
2 3 2.8575e-3 0.59055 3.81e-4 0. 5.08e-4 40.0306-1
! Assume thickness=0.088"; 1/2 channel on each side of plate
7.435e-5 4.325e-3 0.0688 0. 0.066548 0.0022352 0307-1
7.435e-5 4.325e-3 0.0688 0. 0.066548 0.0022352 0307-1
0.0665488 0308-1
1. 0309-1
! 1000 gpm (115 F)
0.06975 0.06975 0310-1
0.17 0. 0.17 0.01 46.11 0. 0500
0. 0. 0. 0500
0 0.0001 32.5 0. 0. 0600
! Equilibrium Core, Assembly D6, Plate 1
-18 0700
0.00000 0.00536 0.56185 0701
0.01071 0.03928 0.48115 0701
0.06786 0.09643 0.52769 0701
0.12500 0.15625 0.62614 0701
0.18750 0.21875 0.74583 0701
0.25000 0.28125 0.84137 0701
0.31250 0.34375 0.95889 0701
0.37500 0.40625 1.07059 0701
0.43750 0.46875 1.17284 0701
0.50000 0.53125 1.25813 0701
0.56250 0.59375 1.31201 0701
0.62500 0.65625 1.32483 0701
0.68750 0.71875 1.28940 0701
0.75000 0.78125 1.24832 0701
0.81250 0.84375 1.12725 0701
0.87500 0.90625 1.00578 0701
0.93750 0.96875 0.99993 0701
1.00000 0701
0 0702
```

For 1200 gpm: "R:\Rhode_Island\SAR_update\PLTEMP_Forced-Flow_July2010\RI_1200gpm_01.inp"

```

! Rhode Island, equilibrium core, 1 internal plate (LEU)
RINSC, 88 mil channel, 1 internal plate; 1580 gpm
1 0 0 1 0 1 0 0 0 0 0 0 0 2 1 1 0 0 0100
1. 1. 1.2 00200
5 7.5e-3 3.0e-1 1 1.0 0201
1 3 0. 1. 1. 0 0 0203
1.24 1.28 1.23 30300-1
1 2 1. 0300A-1
1 1 1 0301-1
1.32483 0302-1
1. 1. 0. 0. 0303-1
1. 1. 0.59055 0. 0.066548 0.0022352 0304-1
1. 1. 0. 0. 0304-1
0. 0. 0. 0304-1
! channel length (fueled portion)=23.25"=0.59055 m, total width=2.62"=0.066548 m,
! and thickness=0.088"=0.0022352 m
! plate fueled width=2.395"
! channel unfueled width (each side)=(2.62"-2.395")/2=0.1125"=2.8575e-3 m
! clad thickness =0.015"=3.81e-4 m; meat thickness=0.020"=5.08e-4 m
2 3 2.8575e-3 0.59055 3.81e-4 0. 5.08e-4 40.0306-1
! Assume thickness=0.088"; 1/2 channel on each side of plate
7.435e-5 4.325e-3 0.0688 0. 0.066548 0.0022352 0307-1
7.435e-5 4.325e-3 0.0688 0. 0.066548 0.0022352 0307-1
0.0665488 0308-1
1. 0309-1
! 1200 gpm (115 F)
0.08380 0.08380 0310-1
0.17 0. 0.17 0.01 46.11 0. 0500
0. 0. 0500
0 0.0001 32.5 0. 0. 0600
! Equilibrium Core, Assembly D6, Plate 1
-18 0700
0.00000 0.00536 0.56185 0701
0.01071 0.03928 0.48115 0701
0.06786 0.09643 0.52769 0701
0.12500 0.15625 0.62614 0701
0.18750 0.21875 0.74583 0701
0.25000 0.28125 0.84137 0701
0.31250 0.34375 0.95889 0701
0.37500 0.40625 1.07059 0701
0.43750 0.46875 1.17284 0701
0.50000 0.53125 1.25813 0701
0.56250 0.59375 1.31201 0701
0.62500 0.65625 1.32483 0701
0.68750 0.71875 1.28940 0701
0.75000 0.78125 1.24832 0701
0.81250 0.84375 1.12725 0701
0.87500 0.90625 1.00578 0701
0.93750 0.96875 0.99993 0701
1.00000 0701
0 0702

```

For 1400 gpm: "R:\Rhode_Island\SAR_update\PLTEMP_Forced-Flow_July2010\RI_1400gpm_01.inp"

```

! Rhode Island, equilibrium core, 1 internal plate (LEU)
RINSC, 88 mil channel, 1 internal plate; 1400 gpm
1 0 0 1 0 1 0 0 0 0 0 0 0 2 1 1 0 0 0100
1. 1. 1.2 00200
5 7.5e-3 3.0e-1 1 1.0 0201
1 3 0. 1. 1. 0 0 0203
1.24 1.28 1.23 30300-1
1 2 1. 0300A-1
1 1 1 0301-1
1.32483 0302-1
1. 1. 0. 0. 0303-1
1. 1. 0.59055 0. 0.066548 0.0022352 0304-1
1. 1. 0. 0. 0304-1
0. 0. 0. 0304-1
0305-1
! channel length (fueled portion)=23.25"=0.59055 m, total width=2.62"=0.066548 m,
! and thickness=0.088"=0.0022352 m
! plate fueled width=2.395"
! channel unfueled width (each side)=(2.62"-2.395")/2=0.1125"=2.8575e-3 m
! clad thickness =0.015"=3.81e-4 m; meat thickness=0.020"=5.08e-4 m
2 3 2.8575e-3 0.59055 3.81e-4 0. 5.08e-4 40.0306-1
! Assume thickness=0.088"; 1/2 channel on each side of plate
7.435e-5 4.325e-3 0.0688 0. 0.066548 0.0022352 0307-1
7.435e-5 4.325e-3 0.0688 0. 0.066548 0.0022352 0307-1
0.0665488 0308-1
1. 0309-1
! 1400 gpm (115 F)
0.09785 0.09785 0310-1
0.17 0. 0.17 0.01 46.11 0. 0500
0. 0. 0500
0 0.0001 32.5 0. 0. 0600
! Equilibrium Core, Assembly D6, Plate 1
-18 0700
0.00000 0.00536 0.56185 0701
0.01071 0.03928 0.48115 0701
0.06786 0.09643 0.52769 0701
0.12500 0.15625 0.62614 0701
0.18750 0.21875 0.74583 0701
0.25000 0.28125 0.84137 0701
0.31250 0.34375 0.95889 0701
0.37500 0.40625 1.07059 0701
0.43750 0.46875 1.17284 0701
0.50000 0.53125 1.25813 0701
0.56250 0.59375 1.31201 0701
0.62500 0.65625 1.32483 0701
0.68750 0.71875 1.28940 0701
0.75000 0.78125 1.24832 0701
0.81250 0.84375 1.12725 0701
0.87500 0.90625 1.00578 0701
0.93750 0.96875 0.99993 0701
1.00000 0701
0 0702

```

For 1580 gpm: "R:\Rhode_Island\SAR_update\PLTEMP_Forced-Flow_July2010\RI_1580gpm_01.inp"

```

! Rhode Island, equilibrium core, 1 internal plate (LEU)
RINSC, 88 mil channel, 1 internal plate; 1580 gpm
1 0 0 1 0 1 0 0 0 0 0 0 0 2 1 1 0 0 0100
1. 1. 1.2 00200
5 7.5e-3 3.0e-1 1 1.0 0201
1 3 0. 1. 1. 0 0 0203
1.24 1.28 1.23 30300-1
1 2 1. 0300A-1
1 1 1 0301-1
1.32483 0302-1
1. 1. 0. 0. 0303-1
1. 1. 0.59055 0. 0.066548 0.0022352 0304-1
1. 1. 0. 0. 0304-1
0. 0. 0. 0304-1
! channel length (fueled portion)=23.25"=0.59055 m, total width=2.62"=0.066548 m,
! and thickness=0.088"=0.0022352 m
! plate fueled width=2.395"
! channel unfueled width (each side)=(2.62"-2.395")/2=0.1125"=2.8575e-3 m
! clad thickness =0.015"=3.81e-4 m; meat thickness=0.020"=5.08e-4 m
2 3 2.8575e-3 0.59055 3.81e-4 0. 5.08e-4 40.0306-1
! Assume thickness=0.088"; 1/2 channel on each side of plate
7.435e-5 4.325e-3 0.0688 0. 0.066548 0.0022352 0307-1
7.435e-5 4.325e-3 0.0688 0. 0.066548 0.0022352 0307-1
0.0665488 0308-1
1. 0309-1
! 1580 gpm (115 F)
0.11050 0.11050 0310-1
0.17 0. 0.17 0.01 46.11 0. 0500
0. 0. 0500
0 0.0001 32.5 0. 0. 0600
! Equilibrium Core, Assembly D6, Plate 1
-18 0700
0.00000 0.00536 0.56185 0701
0.01071 0.03928 0.48115 0701
0.06786 0.09643 0.52769 0701
0.12500 0.15625 0.62614 0701
0.18750 0.21875 0.74583 0701
0.25000 0.28125 0.84137 0701
0.31250 0.34375 0.95889 0701
0.37500 0.40625 1.07059 0701
0.43750 0.46875 1.17284 0701
0.50000 0.53125 1.25813 0701
0.56250 0.59375 1.31201 0701
0.62500 0.65625 1.32483 0701
0.68750 0.71875 1.28940 0701
0.75000 0.78125 1.24832 0701
0.81250 0.84375 1.12725 0701
0.87500 0.90625 1.00578 0701
0.93750 0.96875 0.99993 0701
1.00000 0701
0 0702

```

For 1600 gpm: "R:\Rhode_Island\SAR_update\PLTEMP_Forced-Flow_July2010\RI_1600gpm_01.inp"

```

! Rhode Island, equilibrium core, 1 internal plate (LEU)
RINSC, 88 mil channel, 1 internal plate; 1580 gpm
1 0 0 1 0 1 0 0 0 0 0 0 0 2 1 1 0 0 0100
1. 1. 1.2 00200
5 7.5e-3 3.0e-1 1 1.0 0201
1 3 0. 1. 1. 0 0 0203
1.24 1.28 1.23 30300-1
1 2 1. 0300A-1
1 1 1 0301-1
1.32483 0302-1
1. 1. 0. 0. 0303-1
1. 1. 0.59055 0. 0.066548 0.0022352 0304-1
1. 1. 0. 0. 0304-1
0. 0. 0. 0304-1
0305-1
! channel length (fueled portion)=23.25"=0.59055 m, total width=2.62"=0.066548 m,
! and thickness=0.088"=0.0022352 m
! plate fueled width=2.395"
! channel unfueled width (each side)=(2.62"-2.395")/2=0.1125"=2.8575e-3 m
! clad thickness =0.015"=3.81e-4 m; meat thickness=0.020"=5.08e-4 m
2 3 2.8575e-3 0.59055 3.81e-4 0. 5.08e-4 40.0306-1
! Assume thickness=0.088"; 1/2 channel on each side of plate
7.435e-5 4.325e-3 0.0688 0. 0.066548 0.0022352 0307-1
7.435e-5 4.325e-3 0.0688 0. 0.066548 0.0022352 0307-1
0.0665488 0308-1
1. 0309-1
! 1600 gpm (115 F)
0.11190 0.11190 0310-1
0.17 0. 0.17 0.01 46.11 0. 0500
0. 0. 0500
0 0.0001 32.5 0. 0. 0600
! Equilibrium Core, Assembly D6, Plate 1
-18 0700
0.00000 0.00536 0.56185 0701
0.01071 0.03928 0.48115 0701
0.06786 0.09643 0.52769 0701
0.12500 0.15625 0.62614 0701
0.18750 0.21875 0.74583 0701
0.25000 0.28125 0.84137 0701
0.31250 0.34375 0.95889 0701
0.37500 0.40625 1.07059 0701
0.43750 0.46875 1.17284 0701
0.50000 0.53125 1.25813 0701
0.56250 0.59375 1.31201 0701
0.62500 0.65625 1.32483 0701
0.68750 0.71875 1.28940 0701
0.75000 0.78125 1.24832 0701
0.81250 0.84375 1.12725 0701
0.87500 0.90625 1.00578 0701
0.93750 0.96875 0.99993 0701
1.00000 0701
0 0702

```

For 1800 gpm: "R:\Rhode_Island\SAR_update\PLTEMP_Forced-Flow_July2010\RI_1800gpm_01.inp"

```

! Rhode Island, equilibrium core, 1 internal plate (LEU)
RINSC, 88 mil channel, 1 internal plate; 1580 gpm
1 0 0 1 0 1 0 0 0 0 0 0 0 2 1 1 0 0 0100
1. 1. 1.2 00200
5 7.5e-3 3.0e-1 1 1.0 0201
1 3 0. 1. 1. 0 0 0203
1.24 1.28 1.23 30300-1
1 2 1. 0300A-1
1 1 1 0301-1
1.32483 0302-1
1. 1. 0. 0. 0303-1
1. 1. 0.59055 0. 0.066548 0.0022352 0304-1
1. 1. 0. 0. 0304-1
0. 0. 0. 0304-1
! channel length (fueled portion)=23.25"=0.59055 m, total width=2.62"=0.066548 m,
! and thickness=0.088"=0.0022352 m
! plate fueled width=2.395"
! channel unfueled width (each side)=(2.62"-2.395")/2=0.1125"=2.8575e-3 m
! clad thickness =0.015"=3.81e-4 m; meat thickness=0.020"=5.08e-4 m
2 3 2.8575e-3 0.59055 3.81e-4 0. 5.08e-4 40.0306-1
! Assume thickness=0.088"; 1/2 channel on each side of plate
7.435e-5 4.325e-3 0.0688 0. 0.066548 0.0022352 0307-1
7.435e-5 4.325e-3 0.0688 0. 0.066548 0.0022352 0307-1
0.0665488 0308-1
1. 0309-1
! 1800 gpm (115 F)
0.12600 0.12600 0310-1
0.17 0. 0.17 0.01 46.11 0. 0500
0. 0. 0500
0 0.0001 32.5 0. 0. 0600
! Equilibrium Core, Assembly D6, Plate 1
-18 0700
0.00000 0.00536 0.56185 0701
0.01071 0.03928 0.48115 0701
0.06786 0.09643 0.52769 0701
0.12500 0.15625 0.62614 0701
0.18750 0.21875 0.74583 0701
0.25000 0.28125 0.84137 0701
0.31250 0.34375 0.95889 0701
0.37500 0.40625 1.07059 0701
0.43750 0.46875 1.17284 0701
0.50000 0.53125 1.25813 0701
0.56250 0.59375 1.31201 0701
0.62500 0.65625 1.32483 0701
0.68750 0.71875 1.28940 0701
0.75000 0.78125 1.24832 0701
0.81250 0.84375 1.12725 0701
0.87500 0.90625 1.00578 0701
0.93750 0.96875 0.99993 0701
1.00000 0701
0 0702

```

For 2000 gpm: "R:\Rhode_Island\SAR_update\PLTEMP_Forced-Flow_July2010\RI_2000gpm_01.inp"

```

! Rhode Island, equilibrium core, 1 internal plate (LEU)
RINSC, 88 mil channel, 1 internal plate; 1580 gpm
1 0 0 1 0 1 0 0 0 0 0 0 0 2 1 1 0 0 0100
1. 1. 1.2 00200
5 7.5e-3 3.0e-1 1 1.0 0201
1 3 0. 1. 1. 0 0 0203
1.24 1.28 1.23 30300-1
1 2 1. 0300A-1
1 1 1 0301-1
1.32483 0302-1
1. 1. 0. 0. 0303-1
1. 1. 0.59055 0. 0.066548 0.0022352 0304-1
1. 1. 0. 0. 0304-1
0. 0. 0. 0304-1
0305-1
! channel length (fueled portion)=23.25"=0.59055 m, total width=2.62"=0.066548 m,
! and thickness=0.088"=0.0022352 m
! plate fueled width=2.395"
! channel unfueled width (each side)=(2.62"-2.395")/2=0.1125"=2.8575e-3 m
! clad thickness =0.015"=3.81e-4 m; meat thickness=0.020"=5.08e-4 m
2 3 2.8575e-3 0.59055 3.81e-4 0. 5.08e-4 40.0306-1
! Assume thickness=0.088"; 1/2 channel on each side of plate
7.435e-5 4.325e-3 0.0688 0. 0.066548 0.0022352 0307-1
7.435e-5 4.325e-3 0.0688 0. 0.066548 0.0022352 0307-1
0.0665488 0308-1
1. 0309-1
! 2000 gpm (115 F)
0.14005 0.14005 0310-1
0.17 0. 0.17 0.01 46.11 0. 0500
0. 0. 0500
0 0.0001 32.5 0. 0. 0600
! Equilibrium Core, Assembly D6, Plate 1
-18 0700
0.00000 0.00536 0.56185 0701
0.01071 0.03928 0.48115 0701
0.06786 0.09643 0.52769 0701
0.12500 0.15625 0.62614 0701
0.18750 0.21875 0.74583 0701
0.25000 0.28125 0.84137 0701
0.31250 0.34375 0.95889 0701
0.37500 0.40625 1.07059 0701
0.43750 0.46875 1.17284 0701
0.50000 0.53125 1.25813 0701
0.56250 0.59375 1.31201 0701
0.62500 0.65625 1.32483 0701
0.68750 0.71875 1.28940 0701
0.75000 0.78125 1.24832 0701
0.81250 0.84375 1.12725 0701
0.87500 0.90625 1.00578 0701
0.93750 0.96875 0.99993 0701
1.00000 0701
0 0702

```

For 2200 gpm: "R:\Rhode_Island\SAR_update\PLTEMP_Forced-Flow_July2010\RI_2200gpm_01.inp"

```

! Rhode Island, equilibrium core, 1 internal plate (LEU)
RINSC, 88 mil channel, 1 internal plate; 1580 gpm
1 0 0 1 0 1 0 0 0 0 0 0 0 2 1 1 0 0 0100
1. 1. 1.2 00200
5 7.5e-3 3.0e-1 1 1.0 0201
1 3 0. 1. 1. 0 0 0203
1.24 1.28 1.23 30300-1
1 2 1. 0300A-1
1 1 1 0301-1
1.32483 0302-1
1. 1. 0. 0. 0303-1
1. 1. 0.59055 0. 0.066548 0.0022352 0304-1
1. 1. 0. 0. 0304-1
0. 0. 0. 0304-1
0305-1
! channel length (fueled portion)=23.25"=0.59055 m, total width=2.62"=0.066548 m,
! and thickness=0.088"=0.0022352 m
! plate fueled width=2.395"
! channel unfueled width (each side)=(2.62"-2.395")/2=0.1125"=2.8575e-3 m
! clad thickness =0.015"=3.81e-4 m; meat thickness=0.020"=5.08e-4 m
2 3 2.8575e-3 0.59055 3.81e-4 0. 5.08e-4 40.0306-1
! Assume thickness=0.088"; 1/2 channel on each side of plate
7.435e-5 4.325e-3 0.0688 0. 0.066548 0.0022352 0307-1
7.435e-5 4.325e-3 0.0688 0. 0.066548 0.0022352 0307-1
0.0665488 0308-1
1. 0309-1
! 2200 gpm (115 F)
0.15415 0.15415 0310-1
0.17 0. 0.17 0.01 46.11 0. 0500
0. 0. 0500
0 0.0001 32.5 0. 0. 0600
! Equilibrium Core, Assembly D6, Plate 1
-18 0700
0.00000 0.00536 0.56185 0701
0.01071 0.03928 0.48115 0701
0.06786 0.09643 0.52769 0701
0.12500 0.15625 0.62614 0701
0.18750 0.21875 0.74583 0701
0.25000 0.28125 0.84137 0701
0.31250 0.34375 0.95889 0701
0.37500 0.40625 1.07059 0701
0.43750 0.46875 1.17284 0701
0.50000 0.53125 1.25813 0701
0.56250 0.59375 1.31201 0701
0.62500 0.65625 1.32483 0701
0.68750 0.71875 1.28940 0701
0.75000 0.78125 1.24832 0701
0.81250 0.84375 1.12725 0701
0.87500 0.90625 1.00578 0701
0.93750 0.96875 0.99993 0701
1.00000 0701
0 0702

```


The card numbers in the above files are at the ends of the lines. The above eight files differ only in the 0310-1 Card (310 Card in the PLTEMP/ANL manual) and in the comment card above it. The flow rate for each of the eight input (*.inp) files is specified by the first two words on card 310. Both words are identical and are each half of the adjacent channel flow in kg/s.

Each input file with very minor changes was used to produce four output files.

1. The output files with "ONB" in their names provided the powers at which onset of nucleate boiling occurs. The first word on card 203 should be 4.
2. The output files with "FI" in their names provided the powers at which flow instability occurs. The first word on card 203 should be 7.
3. The output files with "SK_CHF" in their names provided the powers at which critical heat flux based on the Sudo-Kaminaga correlation occurs. The first word on card 203 should be 5 and the third word on card 200 should be 8.
4. The output files with "Mir_CHF" in their names provided the powers at which critical heat flux based on the Mirshak et al. correlation occurs. The first word on card 203 should be 5 and the third word on card 200 should be 0.

All four variations of each input file was used to here to do a complete steady-state thermal-hydraulic analysis of the RINSC reactor under forced flow conditions.

Question 4.19

The PLTEMP/ANL input files used here are the eight provide above for Question 4.15, with the first word on card 203 set to 4 to calculate the power at which the onset of nucleate boiling occurs. The table listed in the response to Question 4.19, with this single card 203 change, used input file "R:\Rhode_Island\SAR_update\PLTEMP_Forced-Flow_July2010\RI_1580gpm_01.inp".

Question 4.21

The PLTEMP/ANL input files used here are the same eight identified above for Question 4.19.

Question 4.32

The PLTEMP/ANL input files used here are the eight identified in Question 4.15 above. Each input file was used twice with minor modifications as follows:

1. The output files with "SK_CHF" in their names provided the powers at which critical heat flux, based on the Sudo-Kaminaga correlation occurs. The first word on card 203 should be 5 and the third word on card 200 should be 8.
2. The output files with "Mir_CHF" in their names provided the powers at which critical heat flux based on the Mirshak et al. correlation occurs. The first word on card 203 should be 5 and the third word on card 200 should be 0.