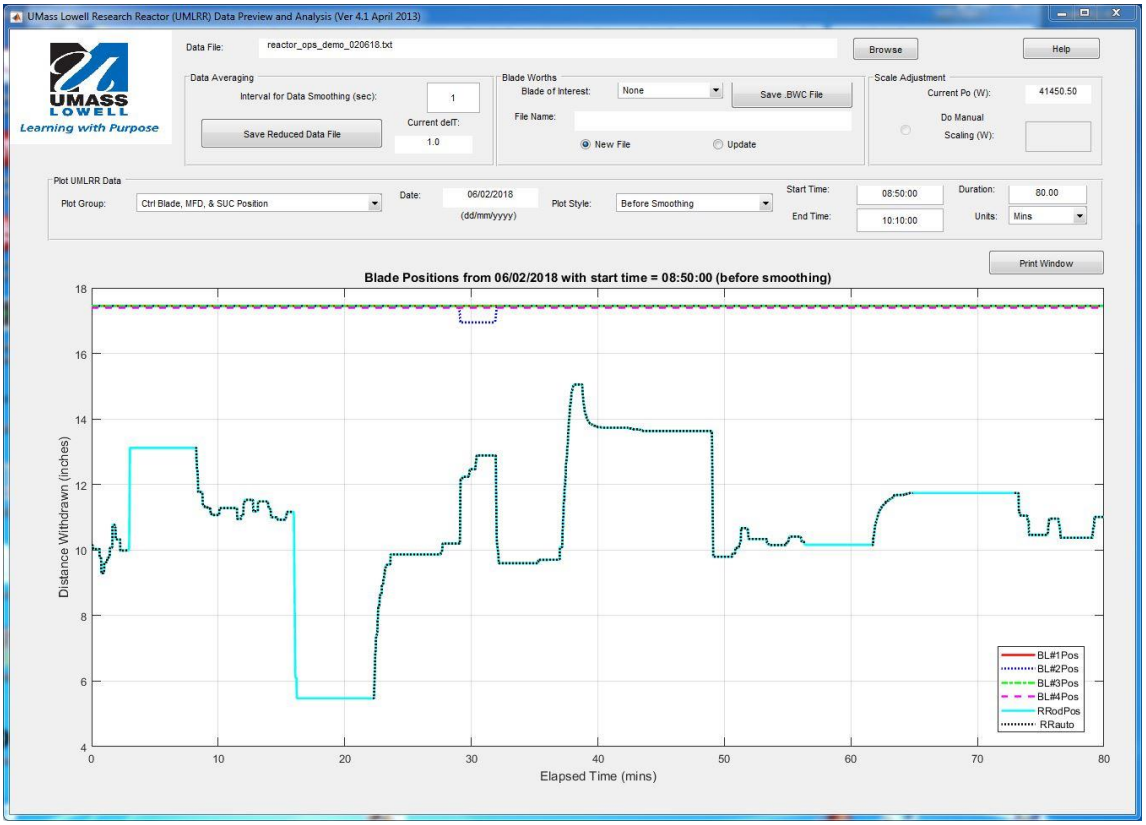
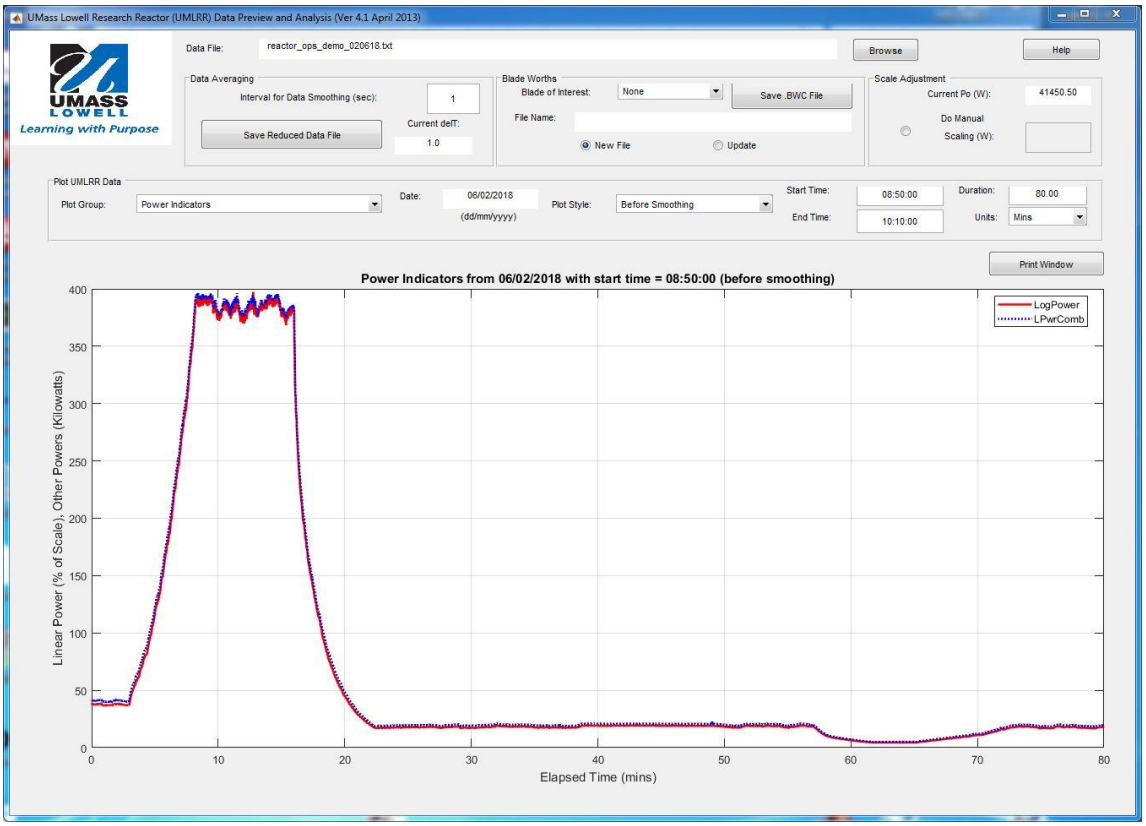
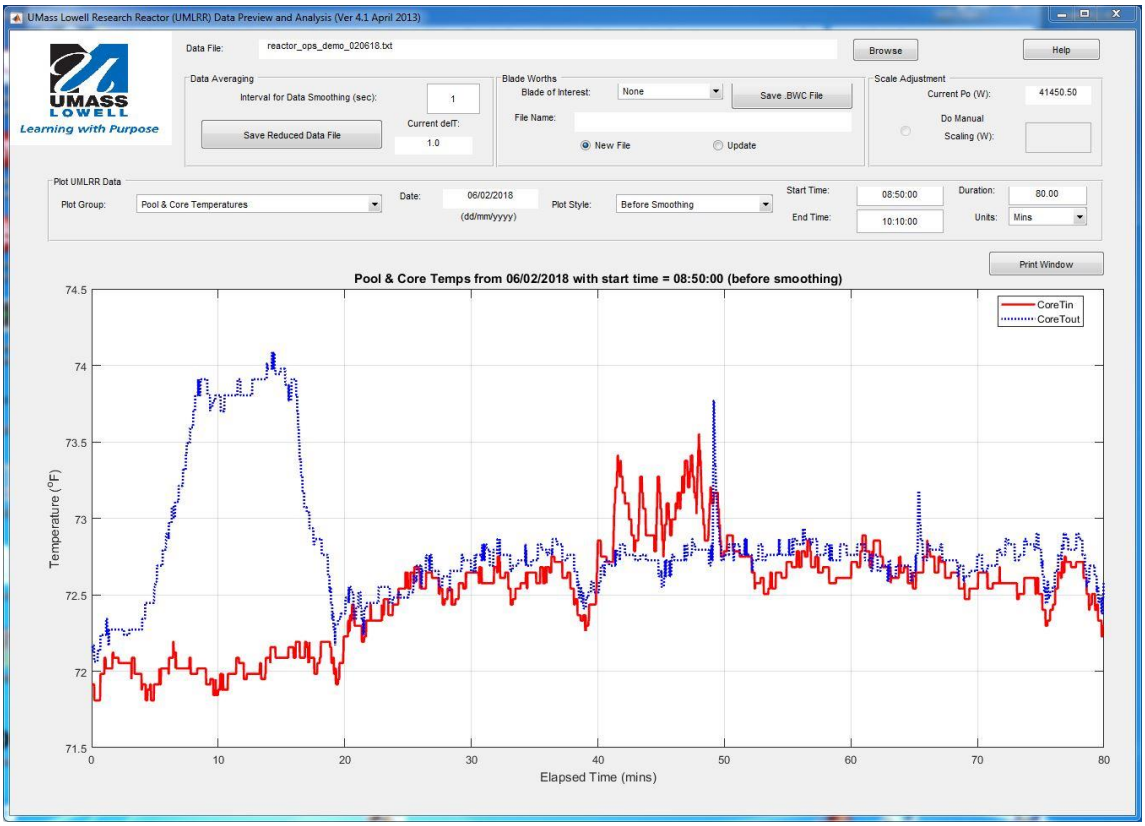
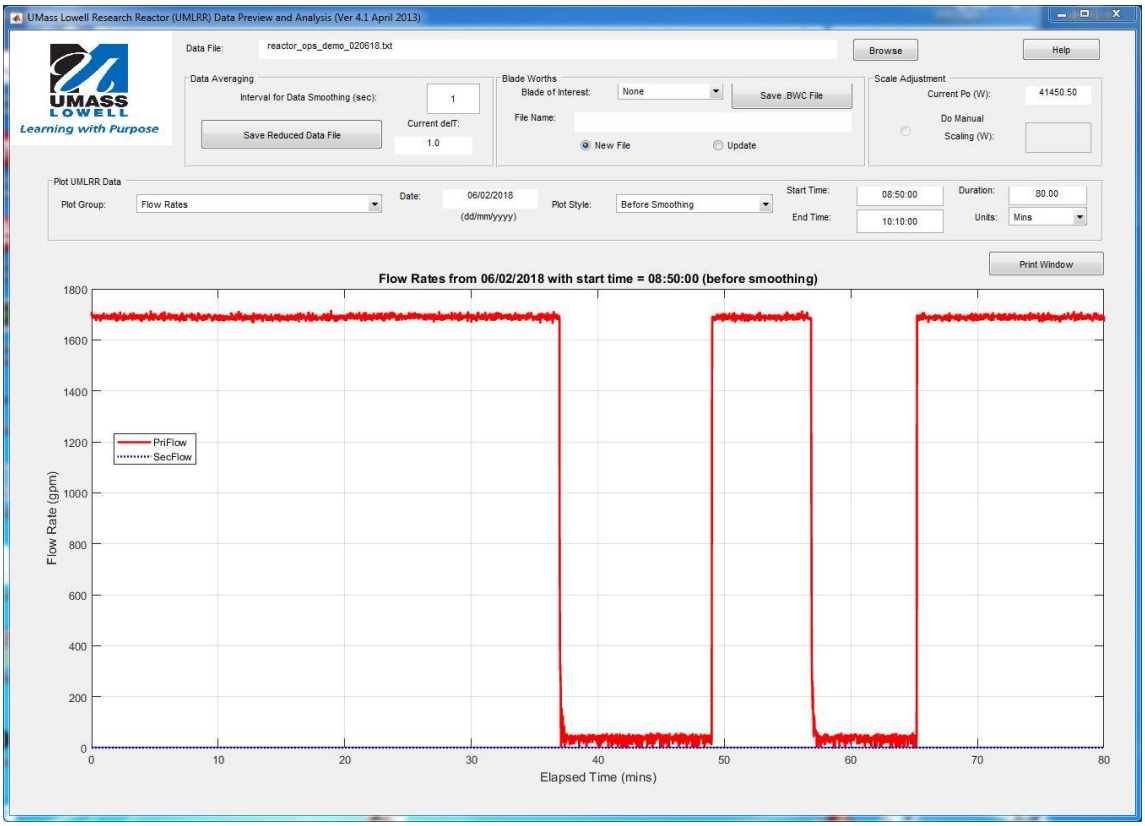
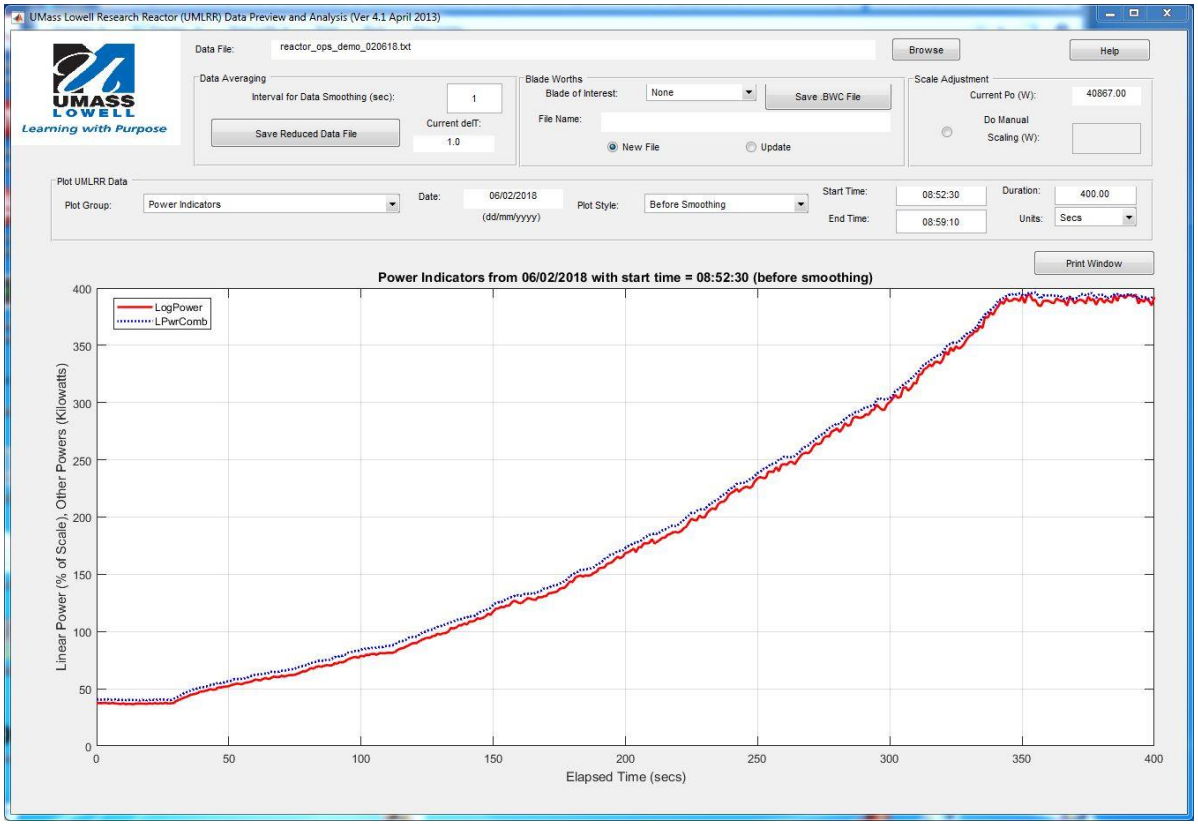
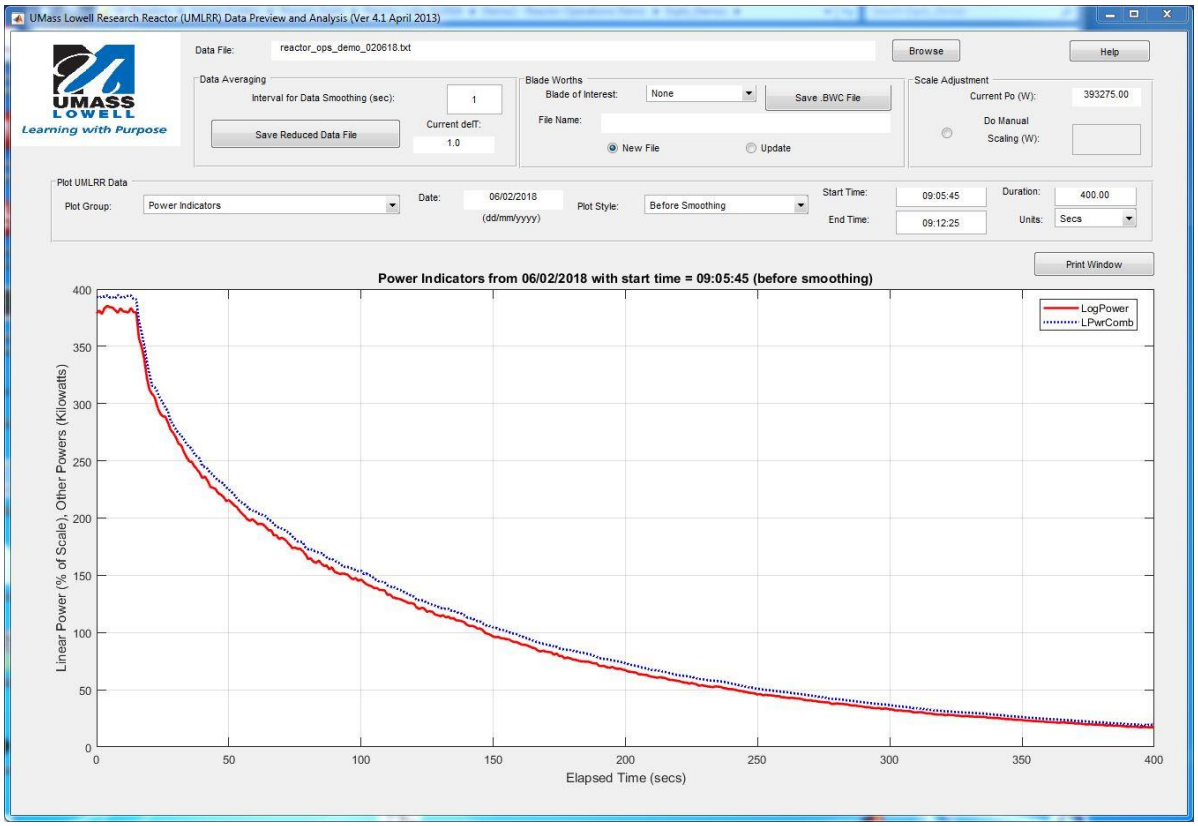

UMass Lowell Research Reactor (UMLRR) Data Preview and Analysis (Ver 4.1 April 2013)
Data File: reactor_ops_demo_020618.txt
Browse
Help
Data Averaging
Interval for Data Smoothing (sec): 1
Save Reduced Data File
Current delT: 1.0
Blade Worths
Blade of Interest: None
Save .BWC File
File Name:
New File
Update
Scale Adjustment
Current Po (W): 41450.50
Do Manual Scaling (W):
Plot UMLRR Data
Plot Group: Ctrl Blade, MFD, & SUC Position
Date: 06/02/2018 (dd/mm/yyyy)
Plot Style: Before Smoothing
Start Time: 08:50:00
End Time: 10:10:00
Duration: 80.00
Units: Mins
Print Window
Blade Positions from 06/02/2018 with start time = 08:50:00 (before smoothing)
Distance Withdrawn (inches)
Elapsed Time (mins)
BL#1Pos
BL#2Pos
BL#3Pos
BL#4Pos
RRodPos
RRauto


UMass Lowell Research Reactor (UMLRR) Data Preview and Analysis (Ver 4.1 April 2013)
Data File: reactor_ops_demo_020618.txt
Browse
Help
Data Averaging
Interval for Data Smoothing (sec): 1
Save Reduced Data File
Current delT: 1.0
Blade Worths
Blade of Interest: None
Save .BWC File
File Name:
New File
Update
Scale Adjustment
Current Po (W): 41450.50
Do Manual Scaling (W):
Plot UMLRR Data
Plot Group: Power Indicators
Date: 06/02/2018 (dd/mm/yyyy)
Plot Style: Before Smoothing
Start Time: 08:50:00
End Time: 10:10:00
Duration: 80.00
Units: Mins
Print Window
Power Indicators from 06/02/2018 with start time = 08:50:00 (before smoothing)
Linear Power (% of Scale), Other Powers (Kilowatts)
Elapsed Time (mins)
LogPower
LPwrComb


UMass Lowell Research Reactor (UMLRR) Data Preview and Analysis (Ver 4.1 April 2013)
Data File: reactor_ops_demo_020618.txt
Browse
Help
Data Averaging
Interval for Data Smoothing (sec): 1
Save Reduced Data File
Current delT: 1.0
Blade Worths
Blade of Interest: None
Save .BWC File
File Name:
New File
Update
Scale Adjustment
Current Po (W): 41450.50
Do Manual Scaling (W):
Plot UMLRR Data
Plot Group: Pool & Core Temperatures
Date: 06/02/2018 (dd/mm/yyyy)
Plot Style: Before Smoothing
Start Time: 08:50:00
End Time: 10:10:00
Duration: 80.00
Units: Mins
Print Window
Pool & Core Temps from 06/02/2018 with start time = 08:50:00 (before smoothing)
CoreTin
CoreTout
Temperature (°F)
Elapsed Time (mins)


UMass Lowell Research Reactor (UMLRR) Data Preview and Analysis (Ver 4.1 April 2013)
Data File: reactor_ops_demo_020618.txt
Browse
Help
Data Averaging
Interval for Data Smoothing (sec): 1
Save Reduced Data File
Current delT: 1.0
Blade Worths
Blade of Interest: None
Save .BWC File
File Name:
New File
Update
Scale Adjustment
Current Po (W): 41450.50
Do Manual Scaling (W):
Plot UMLRR Data
Plot Group: Flow Rates
Date: 06/02/2018 (dd/mm/yyyy)
Plot Style: Before Smoothing
Start Time: 08:50:00
End Time: 10:10:00
Duration: 80.00
Units: Mins
Print Window
Flow Rates from 06/02/2018 with start time = 08:50:00 (before smoothing)
PriFlow
SecFlow
Flow Rate (gpm)
Elapsed Time (mins)


UMass Lowell Research Reactor (UMLRR) Data Preview and Analysis (Ver 4.1 April 2013)
Data File: reactor_ops_demo_020618.txt
Browse
Help
Data Averaging
Interval for Data Smoothing (sec): 1
Save Reduced Data File
Current delT: 1.0
Blade Worths
Blade of Interest: None
Save .BWC File
File Name:
New File
Update
Scale Adjustment
Current Po (W): 40867.00
Do Manual Scaling (W):
Plot UMLRR Data
Plot Group: Power Indicators
Date: 06/02/2018 (dd/mm/yyyy)
Plot Style: Before Smoothing
Start Time: 08:52:30
End Time: 08:59:10
Duration: 400.00
Units: Secs
Print Window
Power Indicators from 06/02/2018 with start time = 08:52:30 (before smoothing)
LogPower
LPwrComb
Linear Power (% of Scale), Other Powers (Kilowatts)
Elapsed Time (secs)


UMass Lowell Research Reactor (UMLRR) Data Preview and Analysis (Ver 4.1 April 2013)
Data File: reactor_ops_demo_020618.txt
Browse
Help
Data Averaging
Interval for Data Smoothing (sec): 1
Save Reduced Data File
Current delT: 1.0
Blade Worths
Blade of Interest: None
Save .BWC File
File Name:
New File
Update
Scale Adjustment
Current Po (W): 393275.00
Do Manual Scaling (W):
Plot UMLRR Data
Plot Group: Power Indicators
Date: 06/02/2018 (dd/mm/yyyy)
Plot Style: Before Smoothing
Start Time: 09:05:45
End Time: 09:12:25
Duration: 400.00
Units: Secs
Print Window
Power Indicators from 06/02/2018 with start time = 09:05:45 (before smoothing)
LogPower
LPwrComb
Linear Power (% of Scale), Other Powers (Kilowatts)
Elapsed Time (secs)

Problem 1 Results

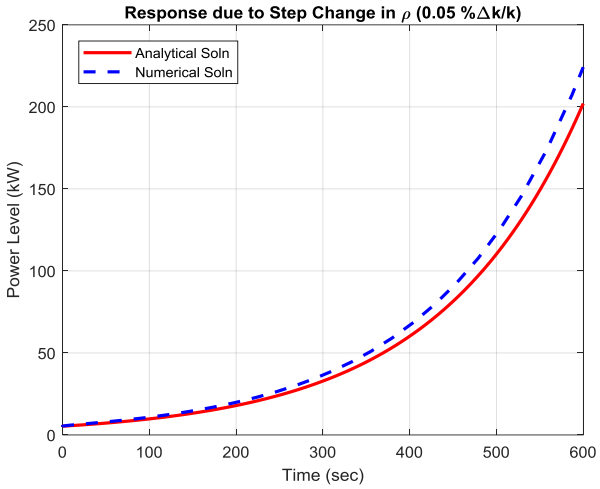
Doubling Time to Reactivity Conversion Examples:

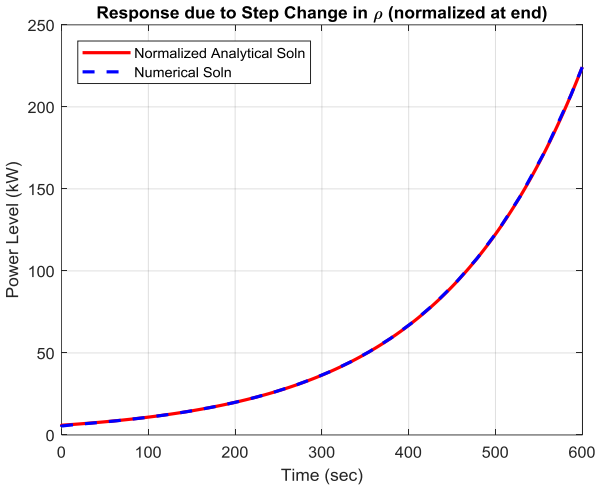
```
>> dt2rho
  Input the Doubling Time in seconds (negative value if decreasing): 120

  Summary Results:
  Measured doubling time:      120.0 seconds
  Asymptotic reactor period:   173.1 seconds
  Estimated reactivity:       0.0480 %Dk/k  ( 6.16 cents)

>> dt2rho
  Input the Doubling Time in seconds (negative value if decreasing): -90

  Summary Results:
  Measured doubling time:      -90.0 seconds
  Asymptotic reactor period:  -129.8 seconds
  Estimated reactivity:      -0.1180 %Dk/k  (-15.12 cents)
```

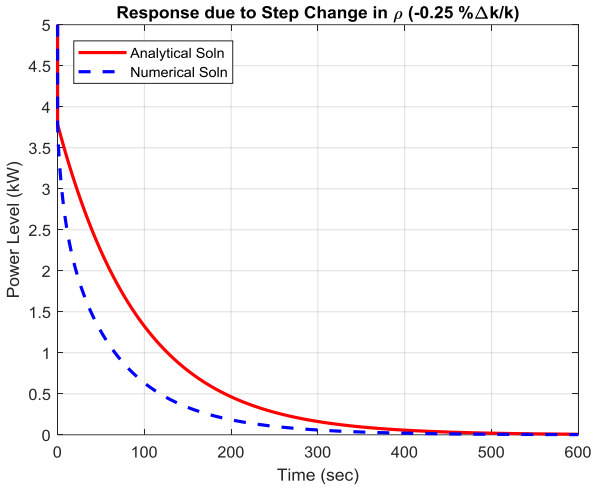
Reactivity to Doubling Time Conversion Examples:

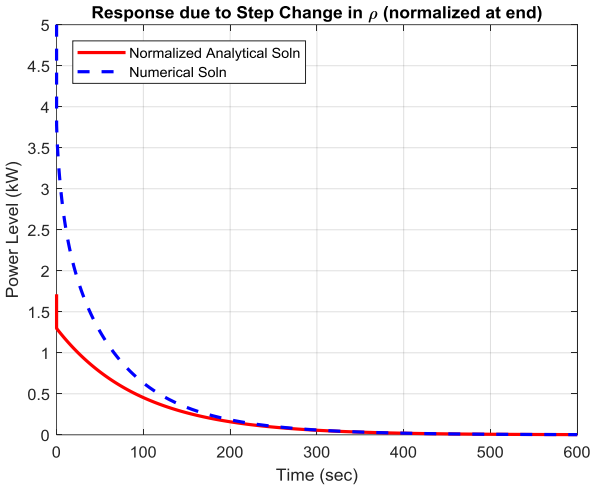
```
>> rho2dt
  Input the reactivity change in %Dk/k: 0.0480

  Summary Results:
  Input reactivity:            0.048 %Dk/k  ( 6.15 cents)
  Asymptotic reactor period:   173.3 seconds
  Expected doubling time:      120.1 seconds

>> rho2dt
  Input the reactivity change in %Dk/k: -0.1180

  Summary Results:
  Input reactivity:           -0.118 %Dk/k  (-15.13 cents)
  Asymptotic reactor period:  -129.8 seconds
  Expected doubling time:      -90.0 seconds
```

Problem 2 Results

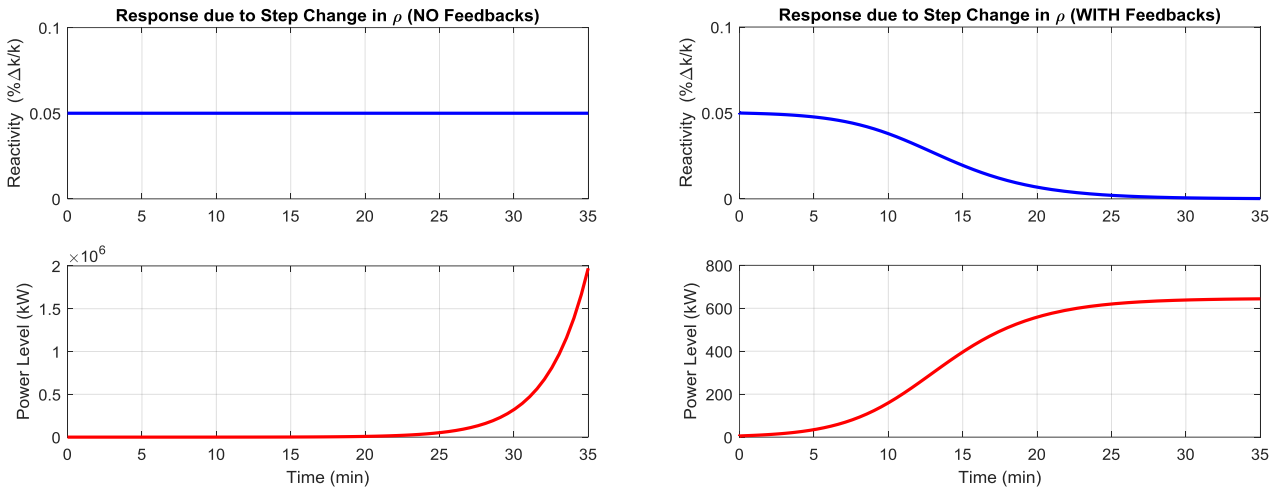


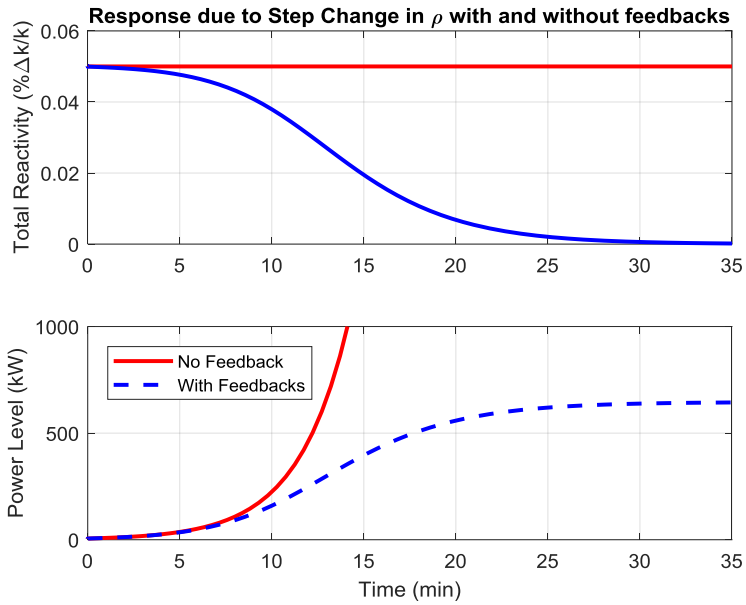






Problem 3 Results





Recall that

$$\rho(t) = \rho_{ext} + \rho_f(t) = \rho_{ext} + \alpha_p\left(P(t) - P_o\right)$$

and, at equilibrium,

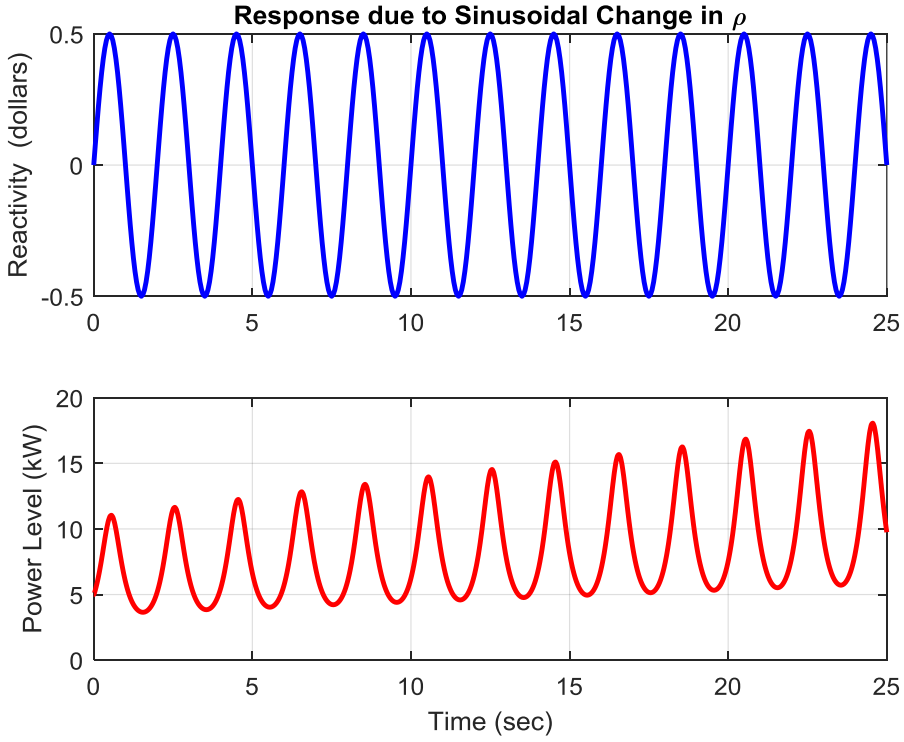
$$\alpha_p\left(P_{new} - P_o\right) = -\rho_{ext} \qquad \text{or} \qquad P_{new} = P_o - \frac{\rho_{ext}}{\alpha_p}$$

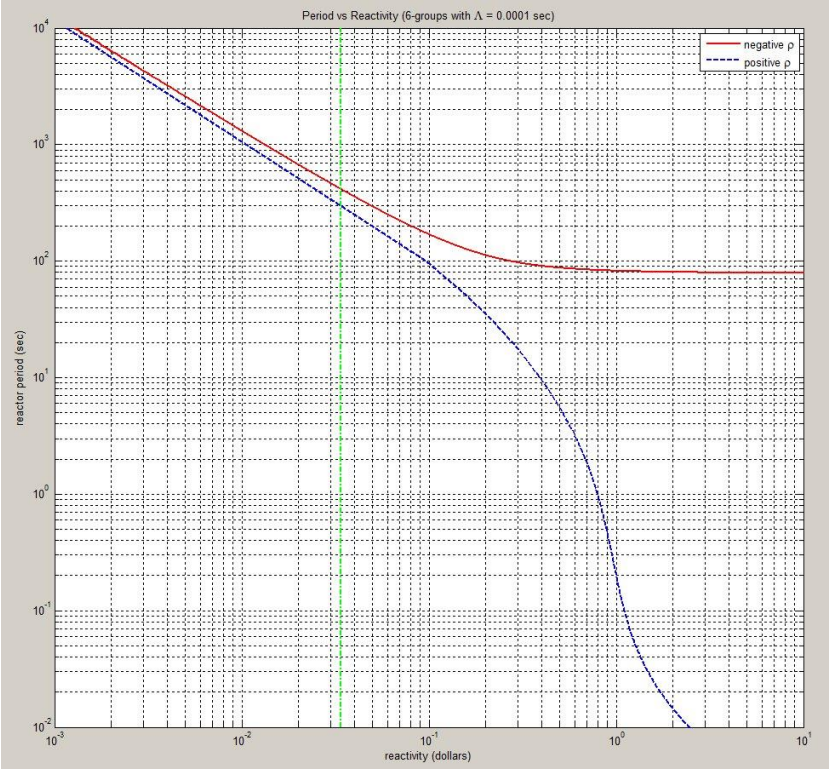
Thus,

$$P_{new} = P_o - \frac{\rho_{ext}}{\alpha_p} = 5\,\text{kW} - \frac{0.00050\,\Delta k/k}{-7.8\times10^{-7}\,\Delta k/k\,\text{per kW}} = 5 + 641 = 646\,\text{kW}$$

and this is approximately as shown above at about 35 minutes (2100 sec) after the start of the transient!!!

Problem 4 Results





Problem 5 Results