# Tutorial 13: FBR Fuel Subassembly Modeling

**Problem Description:**

Table

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The transient condition for the problem is the ramp decrease of 10 kg/s of coolant mass flow rate over a period of 100 s .i.e., flow decreases from 25.3928 kg/s to 15.3928 kg/s (~60 % reduction) over a period of 100 s and remains constant thereafter. Use inbuilt materials.

**Steps:**

The input file for this tutorial problem is saved in /deck/example23.py. The circuit building steps are trivial. Only the notable points in post processing to get the graphs shown in figures below are listed below:

* For clad temperature, use layer mid-wall (s = 0.5) temperature as shown below:

T1 **=** np**.**array**([**face**.**temp\_gues **for** layer **in** hslabs**[**0**].**layers**[:**1**]** **for** face **in** layer**.**ifaces**])**

T2 **=** np**.**array**([**node**.**temp\_gues **for** layer **in** hslabs**[**0**].**layers**[:**1**]** **for** node **in** layer**.**nodes**[**10**:]])**

data\_sim **=** 0.5**\*(**T1**+**T2**)-**273.15

* For fuel centerline temperature, use temperature at s = 0.8 as shown below: (for fuel average temperature, use temperature at s = 0.2)

T1 **=** np**.**array**([**face**.**temp\_gues **for** layer **in** hslabs**[**0**].**layers**[**2**:]** **for** face **in** layer**.**ifaces**[:**10**]])**

T2 **=** np**.**array**([**node**.**temp\_gues **for** layer **in** hslabs**[**0**].**layers**[**2**:]** **for** node **in** layer**.**nodes**[**10**:]])**

data\_sim **=** 0.5**\*(**T1**+**T2**)-**273.15

(Here s represents normalized layer thickness ranging from 0 (meaning upstream surface) to 1 (meaning downstream surface) )

**Chart, line chart

Description automatically generated**

**Steady State Sodium and Clad Temperature Profiles**

**Chart, line chart

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**Steady State Fuel Centreline Temperature Profile**

**Chart, line chart

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**Transient Evolution of Sodium Outlet Temperature**

**Chart, line chart

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**Transient Evolution of Fuel Centreline Temperature (At Core Center)**