MSRE HETEROGENOUS MODEL

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GRIFFIN CALCULATION

- Information required
  - Cross section
  - Mesh
  - Boundary condition (Vacuum/Reflective)
  - Solver
  - Material assignment

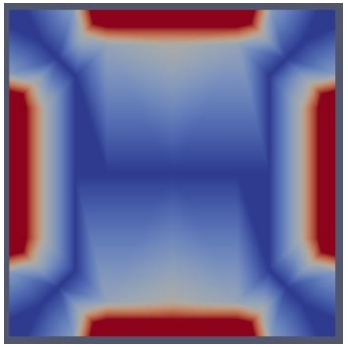
```
[core_fuel_salt]
  type        = MixedNeutronicsMaterial
  block       = '1979 1980 1981 1982 2 3 4 5 6 201 211'
  # block       = '1 2 3 4 5 6 201 211'
  isotopes    = 'pseudo_Be09_A
                 pseudo_F_19_A
                 pseudo_Li06_A
                 pseudo_Li07_A
                 pseudo_U_35_A
                 pseudo_U_38_A
                 pseudo_Zr90_A
                 pseudo_Zr91_A
                 pseudo_Zr92_A
                 pseudo_Zr94_A
                 pseudo_Zr96_A'
  densities   = '9.84823E-03
                 4.94437E-02
                 2.55699E-06
                 2.19199E-02
                 8.38376E-05
                 1.85984E-04
                 8.67636E-04
                 1.89210E-04
                 2.89212E-04
                 2.93091E-04
                 4.72182E-05'
  material_id = 1
[]
```

GRIFFIN CALCULATION

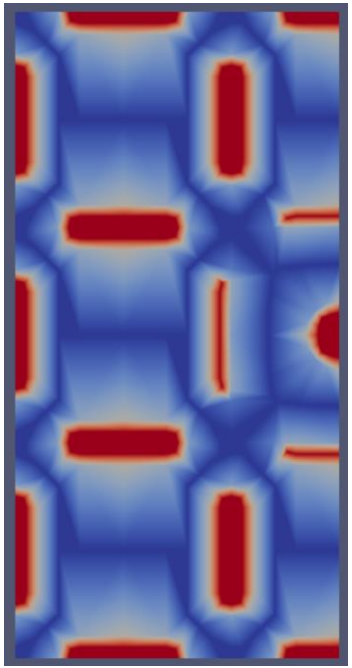
- Diffusion calculation for all cases (using 20-group cross section)
  - Lattice calculation: axial vacuum BC and radial reflective BC
  - Practice problem: reflective BC for both axial and radial boundary
  - Full core: vacuum BC for both axial and radial boundary
  - Difference between OpenMC and Griffin full calculation is -357 pcm.

Code	k-eff	diff [pcm]
OpenMC (full core)	0.97038	-
Griffin (fuel lattice)	1.40948	-
Griffin (practice)	1.60598	-
Griffin (full core)	0.96703	-357

POWER DISTRIBUTION

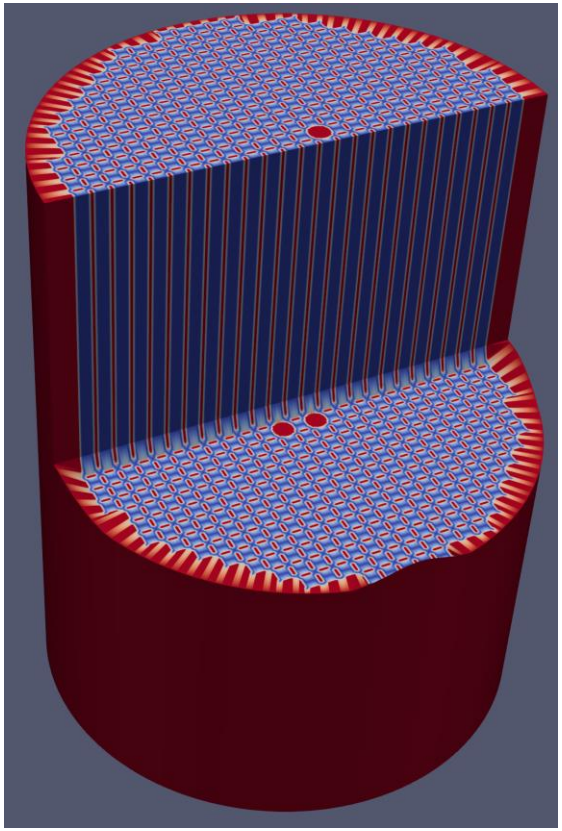


Fuel lattice



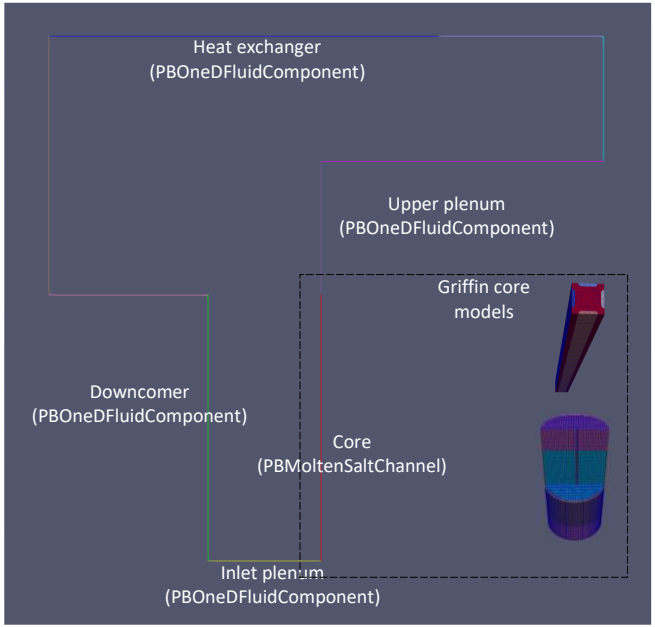
Practice problem

Core



GRIFFIN-SAM COUPLING (I)

- Griffin-SAM coupled model was developed to simulate the pump startup and coastdown transient.
- MultiApp and Transfer systems are used to transfer information between SAM and Griffin.
  - Nearest node transfer in z-direction
- Precursor concentration from the core region (including core, upper and lower plenum) is transferred from SAM to Griffin.
- k-eff and power profile are transferred from Griffin to SAM.



GRIFFIN-SAM COUPLING (II)

- SAM is the main app that drives Griffin eigenvalue calculation at each time step.
  - Single-/Multi-Channel approach in SAM