

MOOSE Project Part 2

- Fuel pin dimensions listed – 2D RZ
- Assume reasonable values for thermal conductivities, constant
- Utilize axial T_{cool} , with $T_{cool}^{in} = 400$ K, reasonable flow rate, heat capacity, etc.
- Utilize axial LHR, with $LHR^0 = 150$ W/cm

$$LHR\left(\frac{z}{Z_o}\right) = LHR^0 \cos\left[\frac{\pi}{2\gamma}\left(\frac{z}{Z_o} - 1\right)\right] = LHR^0 F\left(\frac{z}{Z_o}\right) \quad T_{cool} - T_{cool}^{in} = \frac{1}{1.2} \frac{Z_o \times LHR^0}{\dot{m} C_{PW}} \left\{ \sin(1.2) + \sin\left[1.2\left(\frac{z}{Z_o} - 1\right)\right] \right\}$$

- Solve temperature profile for:
 - @ $z=0.25$, $z=0.5$, $z=1$
- Solve for centerline temperature vs time
 - Transient: Volumetric/Areal heating rate

$$LHR^0(t) = LHR^0(1 - \exp(-0.1 \cdot \text{time})) + 50 \text{ for up to } t=100$$
 - @ $z=0.25$, $z=0.5$, $z=1$
- Find location of peak centerline temperature at steady-state and at $t=100$ in transient

