WISCONSIN
UNIVERSITY OF WISCONSIN–MADISON

MASE/NEEP 423

Nuclear Materials Engineering

Fuel rod properties Nuclear Fuel Performance Code

Calculate the 2D temperature profile for a fuel rod using the following data:

Input	Value	Units
Fuel	UO_2	
Fuel Enrichment q	3.00	
Fuel Density ρ_{F}^{th}	10.412	g/cm^3
Percent Theoretical Density	95	%
Burnable Poison	None	
Linear Heat rate $\mathbf{LHR}$	200	W/cm
Cladding	Zircaloy-4	
Cladding Density ρ_{c}	6.55	g/cm^3
Coolant	H_2O	
Fill gas	Helium	
Fuel Pellet radius R_{F}	4.66E-3	m
Clad Inner Radius	4.69E-3	m
Clad Outer Radius	5.36E-3	m
Clad Thickness δ_c	6.73E-4	m
Gap thickness δ_{gap}	3.0E-5	m
Fuel thermal conductivity k_{f}	3	W/m/K
Cladding thermal conductivity k_{f}	17	W/m/K
Gap thermal conductivity k_{gap}	$AT^{0.79} \times 10^{-4}$	W/m/k
He parameter A for k_{gap}	16	
Convective heat transfer coefficient from clad to coolant h_{cool}	25000	W/m^2/k
Coolant mass flow rate	0.25	kg/s/rod
Rod height	400	cm
Coolant specific heat	4200	J/kg/K
Inlet coolant temperature	570	K