Fuel Pin CFD Parameters & Configuration

Meshing Parameters

Table 1: Mesh Characteristics.

Automated Mesh		
Meshers	Surface Remesher	
	Tetrahedral Mesher	
	Prism Layer Meshers	
Default Controls	Base Size	$5.0 \times 10^{-3}\,\mathrm{mm}$
	Number of Prism Layers	5
	Prism Layer Total Thickness	$5.0\,\%$ (Rel.-to-Base)

Continua Parameters

Table 2: Continua Characteristics of the Cladding Groups.

Coolant Channel Cladding Group & Outer Cladding Physics		
Models	Three Dimenstional	
	Solid	ZrC
	Implicit Unsteady	
	Gradients	
	User Defined EOS	
	Solution Interpolation	
	Segregated Solid Energy	
Reference Values	Minimum Allowable Temperature	$100.0\,\mathrm{K}$
	Maximum Allowable Temperature	$5000.0\,\mathrm{K}$
Initial Conditions	Static Temperature	$300.0\,\mathrm{K}$

Table 3: Continua Characteristics of the Fuel Group.

Fuel Physics		
Models	Three Dimenstional	
	Solid	$(U, Zr) - C$
	Implicit Unsteady	
	Gradients	
	User Defined EOS	
	Solution Interpolation	
	Segregated Solid Energy	
Reference Values	Minimum Allowable Temperature	$100.0\,\mathrm{K}$
	Maximum Allowable Temperature	$5000.0\,\mathrm{K}$
Initial Conditions	Static Temperature	$300.0\,\mathrm{K}$

Table 4: Continua Characteristics of the Coolant Groups.

Coolant Channel Group Physics		
Models	Three Dimenstional	
	Gas	^2H
	Implicit Unsteady	
	Turbulent	
	Reynolds-Averaged Navier-Stokes	
	K-Epsilon Turbulence	
	Realizable K-Epsilon Two-Layer	
	Wall Distance	
	Two-Layer All y+ Wall Treatment	
	Gradients	
	Solution Interpolation	
	Segregated Flow	
	User Defined EOS	
	Segregated Fluid Temperature	
Reference Values	Minimum Allowable Wall Distance	$1.0 \times 10^{-6}\,\mathrm{m}$
	Minimum Allowable Abs. Pressure	$1.0 \times 10^{3}\,\mathrm{Pa}$
	Maximum Allowable Abs. Pressure	$1.0 \times 10^{8}\,\mathrm{Pa}$
	Reference Pressure	$1.013\,25 \times 10^{5}\,\mathrm{Pa}$
	Minimum Allowable Temperature	$100.0\,\mathrm{K}$
	Maximum Allowable Temperature	$5000.0\,\mathrm{K}$
Initial Conditions	Pressure	$3.962 \times 10^{6}\,\mathrm{Pa}$
	Static Temperature	$600.0\,\mathrm{K}$
	Turbulence Specification	K-Epsilon
	Turbulent Dissipation Rate	$0.1\,\mathrm{m}^2/\mathrm{s}^3$
	Turbulent Kinetic Energy	$0.001\,\mathrm{J/kg}$
	Velocity	$-75.96\mathbf{k}\ \mathrm{m/s}$