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	$1.0 \times 10^{-3}\,\mathrm{m}$
	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	$300.0\,\mathrm{K}$

Region Parameters

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	$-75.96\mathbf{k}\ \mathrm{m/s}$

Table 5: Region Parameters.

Coolant Channel Cladding Group & Outer Cladding Regions		
Boundaries	Upstream	Wall
	Downstream	Wall
	Inner Wall	Wall
	Outer Wall	Wall
Fuel Regions		
Boundaries	Upstream	Wall
	Downstream	Wall
	Inner Wall	Wall
	Outer Wall	Wall
Coolant Channel Group Regions		
Boundaries	Upstream	Mass Flow Inlet
	Downstream	Outlet
	Outer Wall	Wall