Partially Premixed Combustion - Numerical Solution

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Problem Specification

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2. Geometry

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Numerical Solution

Skipping to Solution Controls, click "Equations" and deselect the Premixed Combustion and PDF options so that the only equations solved for are flow, swirl velocity, and turbulence as a preliminary solution. Press OK.

Equations	X
Equations Flow	
Swirl Velocity Turbulence Premixed Combustion	
Pdf	
OK Default Cancel	Help

Go to Solution Initialization. Press Initialize; let Fluent initialize the domain as a Hybrid Initialization, taking all boundaries into account.

Go to Run Calculation. Click on "Data File Quantities" and select all of the mass fractions of species, the turbulent flame speed, and the stream function (or click the button at the top right of the selection screen to select all if you would like to monitor other variables). Press OK.

Still on Run Calculation, enter 1000 under the number of iterations and run the simulation until it converges.

Now adapt a small region near the inlet with a progress variable of zero (this region will be entirely recalculated with combustion included):

Go to Adapt-Region at the menus at the top of the page. Select a small region near the inlet: X from 0.1 to 0.14m, Y from 0 to 0.03m. Click "Mark", which marks 207 cells for refinement, and then click "Close".

Region Adaption						
Options	Input Coordinates					
 Inside Outside 	X Min (m)	X Max (m)				
Shapes	Y Min (m)	Y Max (m)				
 Quad Circle 	0	0.03				
Ocylinder	Z Min (m)	Z Max (m)				
Manage	0	0				
Controls	0]				
Select Points with Mouse						
Adapt Mark Close Help						

Patch this region by going to Solution Initialization, and click "Patch". Select "Progress Variable" as the variable, and patch the region that you just marked by clicking "Patch". Close the dialogue after patching.

Patch		×
Reference Frame Relative to Cell Zone Absolute Variable Swirl Velocity Temperature Turbulent Kinetic Energy Turbulent Dissipation Rate Mean Mixture Fraction Mixture Fraction Variance Progress Variable	Value 0 Use Field Function Field Function	Zones to Patch fluid Registers to Patch hexahedron-r0
	Patch Close Help	

Now go back to Solution Controls and click "Equations". Reselect the PDF and Premixed Combustion options so that all options are highlighted and will be solved for. Press OK. In Solution Methods, make sure that all solvers (Momentum, Swirl Velocity, and Turbulent Kinetic Energy) are set to a second order solver scheme.

Go to Run Calculation. Press "Calculate". Allow the solution to converge (convergence criterion being that the residuals are all at least 1E-3 or smaller).



Go to Step 6: Numerical Results

Go to all FLUENT Learning Modules