

FLUENT - Supersonic Flow Over a Wedge- Step 5 (FLUENT 6.3.26)

Problem Specification

1. Create Geometry in GAMBIT
2. Mesh Geometry in GAMBIT
3. Specify Boundary Types in GAMBIT
4. Set Up Problem in FLUENT
5. **Solve**
6. Analyze Results
7. Verify Results



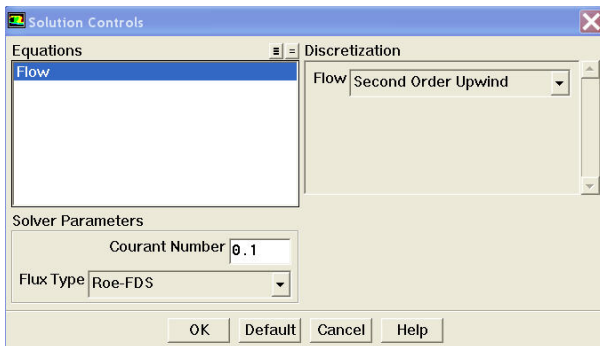
Site Under Construction

These instructions are for FLUENT 6.3.26. [Click here](#) for instructions for FLUENT 12.

Step 5: Solve!

Solve > Control > Solution

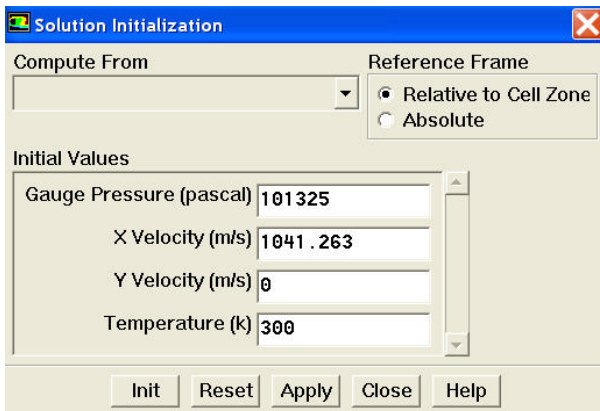
We'll use a second-order discretization scheme. Under **Discretization**, set **Flow** to **Second Order Upwind**. Under Solver Parameters, set the **Courant Number** to 0.1.



Click **OK**.

Solve > Initialize > Initialize...

This is where we set the initial guess values for the iterative solution. We'll use the farfield values ($M=3$, $p=1$ atm, $T=300$ K) as the initial guess for the entire flowfield. Select **farfield** under **Compute From**. This fills in values from the farfield boundary in the corresponding boxes. (Alternately, I could have typed in these values but I like to palm off as much grunt work as possible to the computer.)

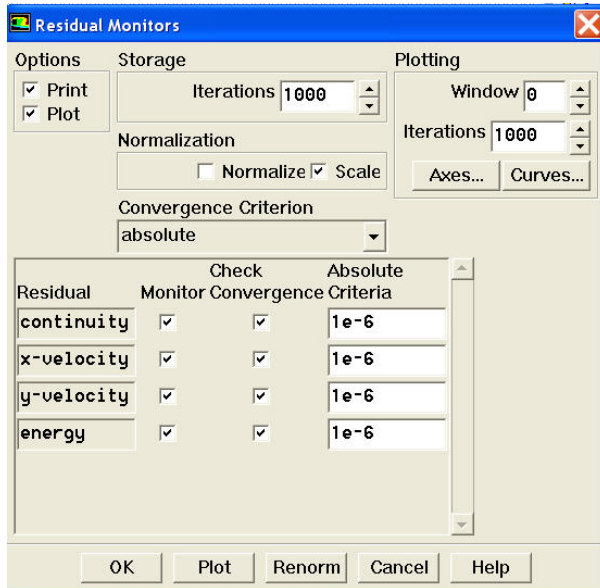


Click **Init**. Now, for each cell in the mesh, $M=3$, $p=1$ atm, $T=300$ K. These values will of course get updated as we iterate the solution below.

FLUENT reports a residual for each governing equation being solved. The residual is a measure of how well the current solution satisfies the discrete form of each governing equation. We'll iterate the solution until the residual for each equation falls below $1e-6$.

Solve > Monitors > Residual...

Set **Absolute Criteria** for **all equations** to $1e-6$.



Also, under **Options**, select **Plot**. This will plot the residuals in the graphics window as they are calculated, giving you a visual feel for if/how the iterations are proceeding to convergence.

Click **OK**.

Main Menu > File > Write > Case...

This will save your FLUENT settings and the mesh to a "case" file. Type in wedge.cas for **Case File**. Click **OK**.

Solve > Iterate

Set the **Number of Iterations** to 1000. Click **Iterate**.

The residuals for each iteration are printed out as well as plotted in the graphics window as they are calculated. The residuals after 1000 iterations are not below the convergence criterion of $1e-6$ specified before. So run the solution for 1000 more iterations. The solution converges in about 1510 iterations; the residuals for all the governing equations are below $1e-6$ at this point.

Save the solution to a data file:

Main Menu > File > Write > Data...

Enter wedge.dat for Data File and click OK. Check that the file has been created in your working directory. You can retrieve the current solution from this data file at any time.

Go to [Step 6: Analyze Results](#)

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