FLUENT - Steady Flow Past a Cylinder - Step 6

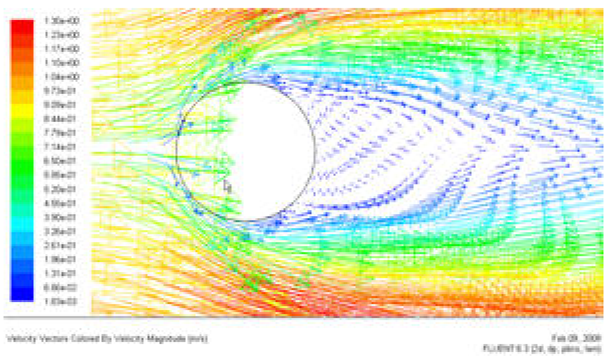
Step 6: Analyze Results

Plot Velocity Vectors

Let's plot the velocity vectors obtained from the FLUENT solution.

Display > Vectors

Set the ***Scale*** to 14 and ***Skip*** to 4. Click ***Display***.



Higher Resolution Image

From this figure, we see that there is a region of low velocity and recirculation at the back of cylinder.

> **Zoom in the cylinder using the middle mouse button.**

Pressure Coefficient

Pressure coefficient is a dimensionless parameter defined by the equation $$C_p = \frac{(p - p_{ref})}{q_{ref}}$$ where *p* is the static pressure, p_{ref} is the reference pressure, and q_{ref} is the reference dynamic pressure defined by

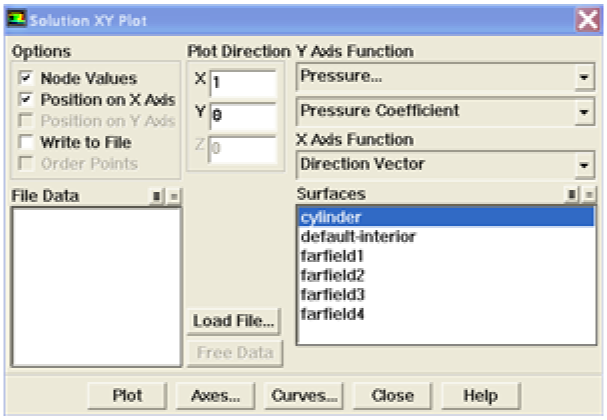
$$q_{ref} = \frac{1}{2}\rho_{ref} v_{ref}^2$$

The reference pressure, density, and velocity are defined in the **Reference Values** panel in Step 5.

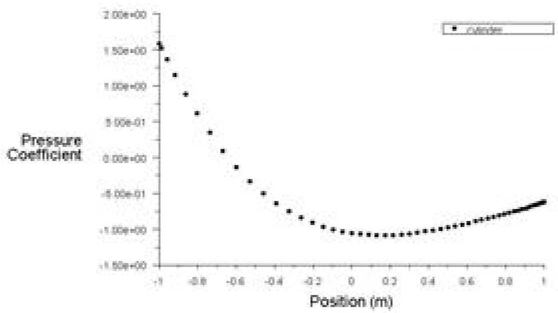
Let's plot pressure coefficient vs x-direction along the cylinder.

Plot > XY Plot...

Change the ***Y Axis Function*** to ***Pressure***..., followed by ***Pressure Coefficient***. Then, select ***cylinder*** under ***Surfaces***.



Click ***Plot***.



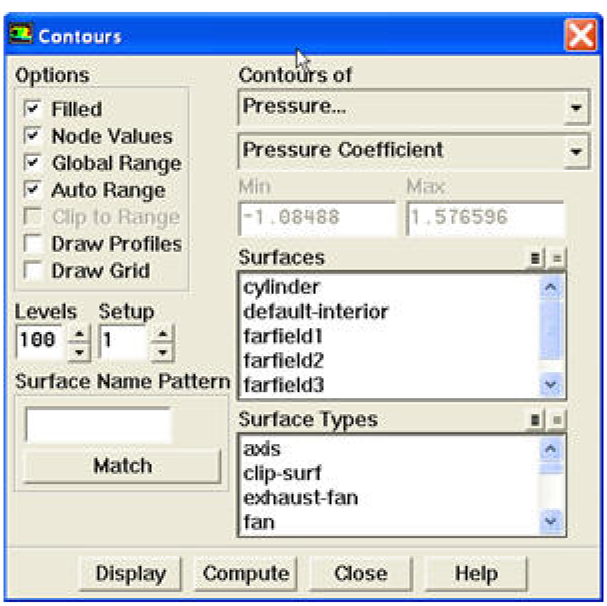
Higher Resolution Image

As can be seen, the pressure coefficient at the back is lower than the pressure coefficient at the front of the cylinder. The irrecoverable pressure is due to the separation at the back of cylinder and the frictional loss.

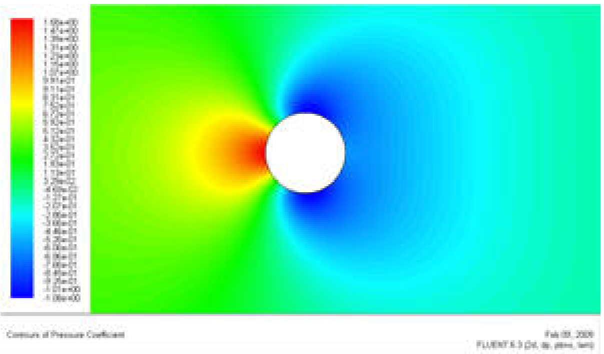
Now, let's take a look at the Contour of Pressure Coefficient variation around the cylinder.

Display > Contours

Under ***Contours of***, choose ***Pressure..*** and ***Pressure Coefficient***. Select the ***Filled*** option. Increase the number of contour levels plotted: set ***Levels*** to `100`.



Click ***Display***.



Higher Resolution Image

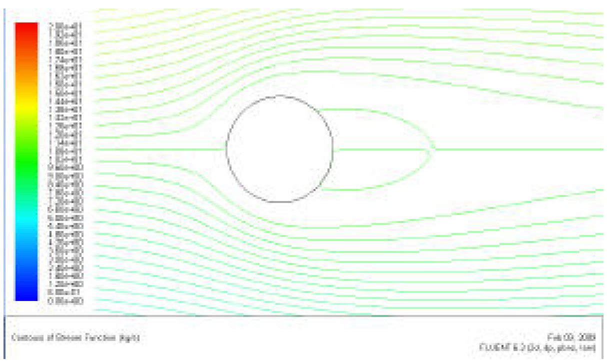
Because the cylinder is symmetry in shape, we see that the pressure coefficient profile is symmetry between the top and bottom of cylinder.

Plot Stream Function

Now, let's take a look at the Stream Function.

Display > Contours

Under ***Contours of***, choose ***Velocity..*** and ***Stream Function***. Deselect the ***Filled*** option. Click ***Display***.



Higher Resolution Image

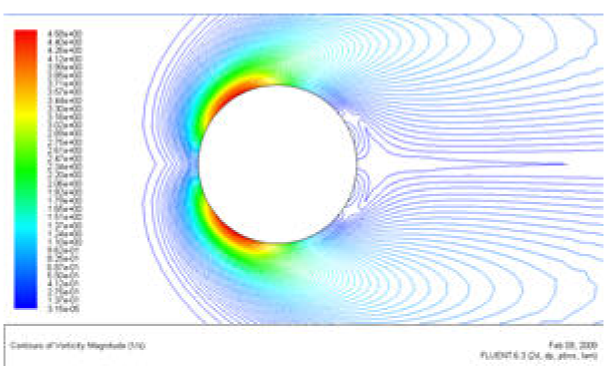
Enclosed streamlines at the back of cylinder clearly shows the recirculation region.

Plot Vorticity Magnitude

Let's take a look at the Pressure Coefficient variation around the cylinder. Vorticity is a measure of the rate of rotation in a fluid.

Display > Contours

Under ***Contours of***, choose ***Velocity..*** and ***Vorticity Magnitude***. Deselect the ***Filled*** option. Click ***Display***.



Higher Resolution Image

Go to Step 7: Refine Mesh

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