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- 6. Analyze Results
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# Step 6: Analyze Results

### **Calculate Strouhal Number**

Lift convergence plot can be used to compute the correct value of Strouhal number. Non-dimensionalize the problem and Sr = f\*D/U = 0.0859 \* 2 = 0.172. The results matches fairly well with the value 0.183 as reported by Williamson

#### Calculating Shedding Frequency (i)

To accurately calculate the shedding frequency, open the cl-history file (saved previously in the same location where the original mesh was read) and plot the data using excel for better data representation and graphing option. Take an average of 10 shedding cycles (e.g 10 CL peak).

$$\text{Period} = \frac{T_2 - T_1}{10}$$

$$f = \frac{1}{Period}$$
$$Sr = \frac{fD}{U}$$

An example of Lift Convergence Plot plotted using excel is shown below:



**Display Pressure Contours** 

Options	Contours of		
▼ Filled         ▼ Node Values         ▼ Global Range         ▲ Auto Range         □ Clip to Range         □ Draw Profiles         □ Draw Grid         Levels       Setup         100 ÷       1 ÷         Surface Name Pattern         Match	Pressure		3
	Pressure Coefficient		
	Min	Max	
	-1.225	0.5	_
	Surfaces		=]=]
	cylinder default-interior ff1 ff2 ff3	Ú.	< >
	Surface Types		=
	axis clip-surf exhaust-fan fan		< >

Under Contours of, choose Pressure.. and Pressure Coefficient. Select the Filled option. Increase the number of contour levels plotted. Set Levels to 1 00. Disable Auto Range and Clip to Range from the Options group box. Enter -1.225 and 0.5 for Min and Max, respectively.Click Display.



#### Higher Resolution Image

The contour shows a clear asymmetric pattern in the flow. The local pressure minima (the green patch downstream) are the center of the vortices.

## **Display Contour of Vorticity Magnitude**

Main Menu > Display > Contours

Options	Contours of		
Filled	Velocity		
<ul> <li>Node Values</li> <li>Global Range</li> </ul>	Vorticity Magnit	Vorticity Magnitude	
C Auto Range	Min (1/s)	Max (1/s)	
Clip to Range	0.0001	2	_
Draw Profiles	Surfaces		-
Levels Setup 50 + 1 + Surface Name Patte	cylinder default-interior ff1 ff2 ff3		< >
	Surface Types		=
Match	axis clip-surf exhaust-fan fan		< >

Under Contours of, choose Velocity.. and Vorticity Magnitude. Disable Auto Range and Clip to Range from the Options group box. Enter 0.0001 and 2 for Min and Max, respectively. Select Levels to 50. Click Display.

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#### Higher Resolution Image

This figure shows clear vortex shedding process. Zoom in the view around cylinder.

Go to Step 7: Validate the Results

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