

# **57:020 Mechanics of Fluids and Transport Processes**

## **Simulation of Turbulent Flow around an Airfoil**

Submitted to: Professor Frederick Stern

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Department: \_\_\_\_\_

Group: \_\_\_\_\_

Lab Date: Month/Date/Year

Submission Date: Month/Date/Year

**I. CFD PreLab 2 Questions (submitted before PreLab1, 10 points)**

**II. Test and Simulation Design (10 points)**

Using your own words to describe the purpose of the CFD simulation.

**III. CFD Process (10 points)**

Using either table or Flow chart to describe the correct CFD Process, which options will be used in CFD PreLab 1 and CFD Lab 1, and what parameters (with values) need to be specified for each option.

**IV. Data Analysis and Discussion (50 points)**

1. Figures, data and questions in CFD PreLab 2 (Simulation of Turbulent flow around an airfoil, 20 points)

A. Validation using EFD Lab 3 data using k-e model (7 points)

	<b>EFD</b>	<b>CFD</b>	<b>Relative Error (%)</b>
<b>Lift coef.</b>			
<b>Drag coef.</b>			

  

	Figure 1. Residuals
Figure 2. Pressure coefficient distribution (CFD and EFD)	Figure 3. Contour of pressure
Figure 4. Contour of velocity magnitude	Figure 5. Velocity vectors

<p>Figure 6. Streamlines close to airfoil surface</p>	
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**B. Inviscid Flow Simulation (7 points)**

<p>Lift Coefficient (CFD)= _____          Drag Coefficient (CFD)= _____</p>	<p>Figure 1. Residuals</p>
<p>Figure 2. Pressure coefficient distribution (CFD only)</p>	<p>Figure 3. Contour of pressure</p>
<p>Figure 4. Contour of velocity magnitude</p>	<p>Figure 5. Velocity vectors</p>
<p>Figure 6. Streamlines close to airfoil surface</p>	