Final Fluent Project

Fluent Wind Tunnel Simulation

Team Members:
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Gabriel Ospina

Due Date: July 30th, 2025

Fluid Mechanics I EML 3701
Monday 2:00 PM – 3:50 PM

Video Links:

Part A) https://www.youtube.com/watch?v=Vq42Dfj1NkA&ab_channel=Cacoman
Part B) https://www.youtube.com/watch?v=c6F3WxY49ag&ab_channel=Cacoman
Part C) https://www.youtube.com/watch?v=hfHztBSnyhk&ab_channel=Cacoman

Part A:

Figure 1: Static Pressure Contour

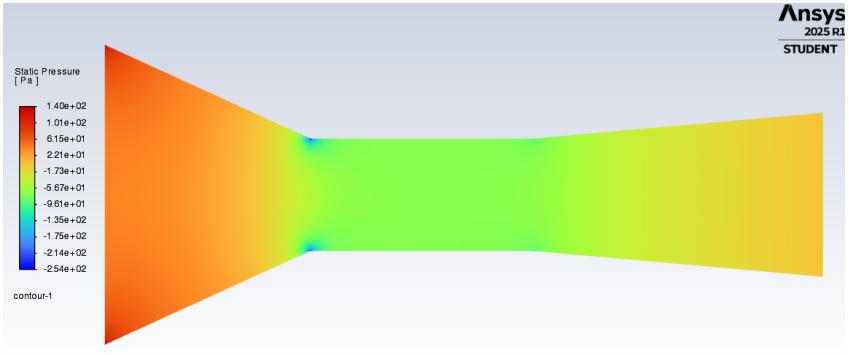


Figure 2: Velocity Mag Contour

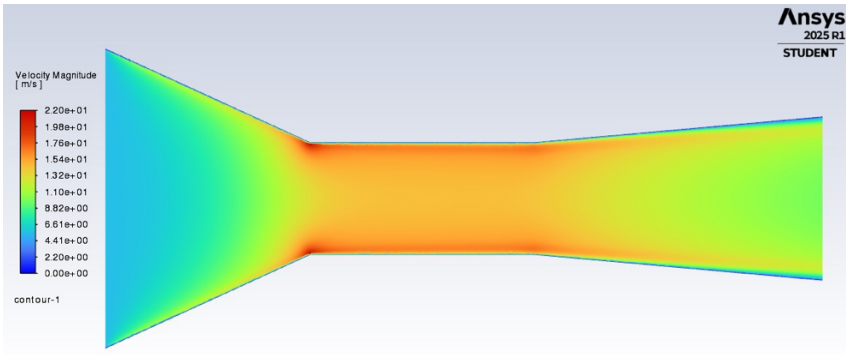


Figure 3: Total Pressure Contour

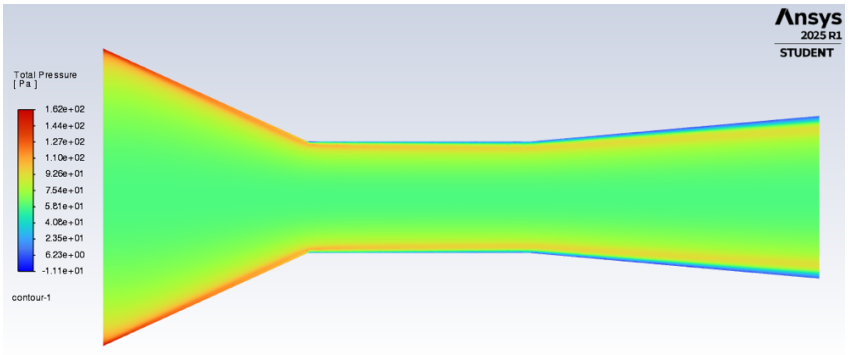


Figure 4: Dynamic Pressure Contour

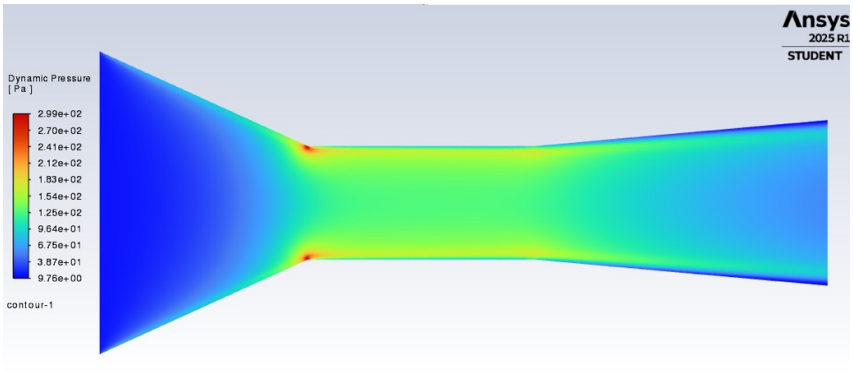


Figure 5: Streamline Patters in the Wind Tunnel

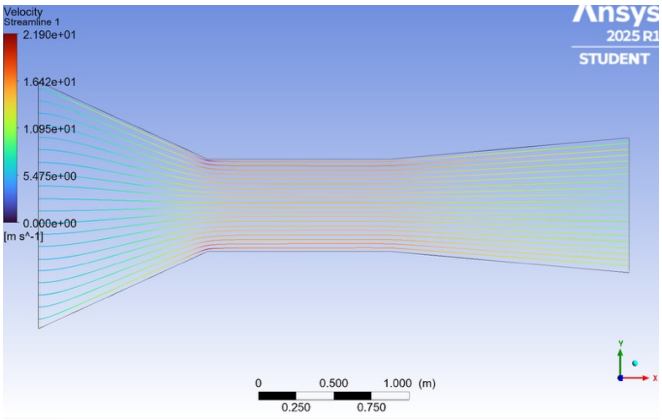


Figure 6: Variation of Pressure Along the Centerline of the Wind Tunnel

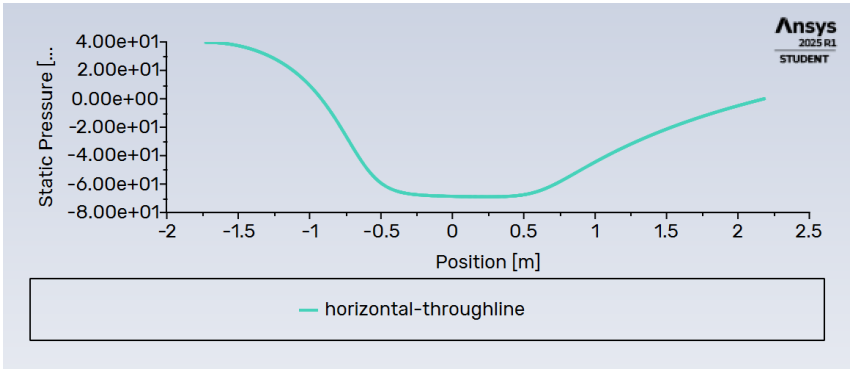


Figure 7: Variation of Velocity Along the Centerline of the Wind Tunnel

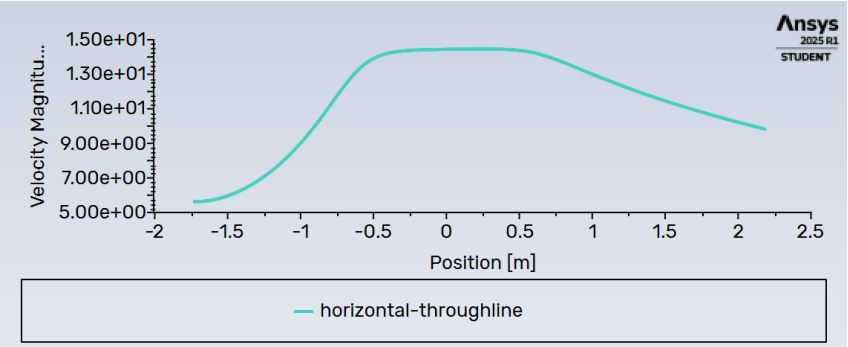


Figure 8: Variation of Total Pressure Along the Centerline of the Wind Tunnel

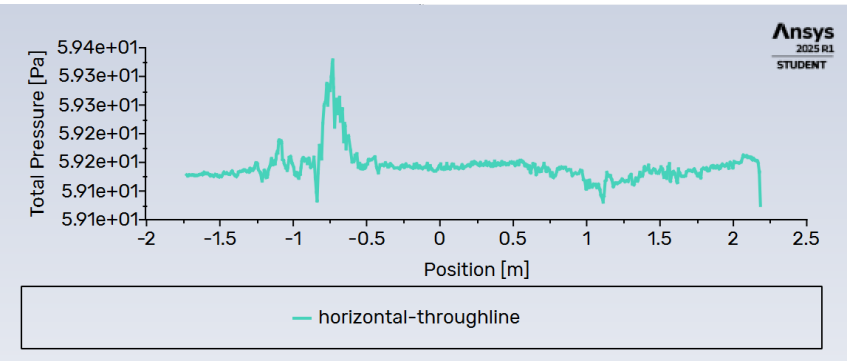


Figure 9: Variation of Dynamic Pressure Along the Centerline of the Wind Tunnel

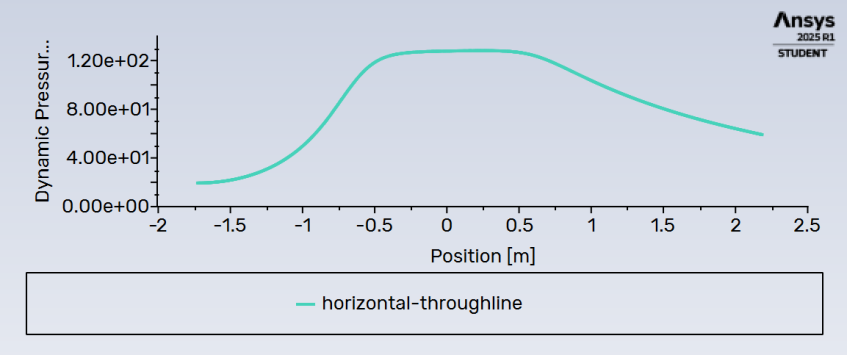


Figure 10: Vertical Distribution of Velocity

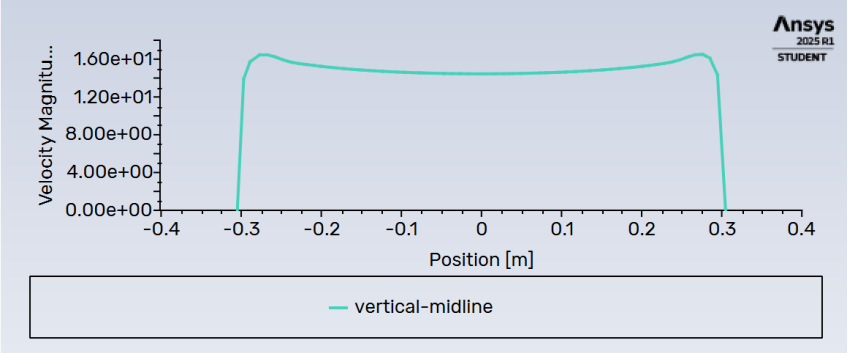


Figure 11: Vertical Distribution of Dynamic Pressure

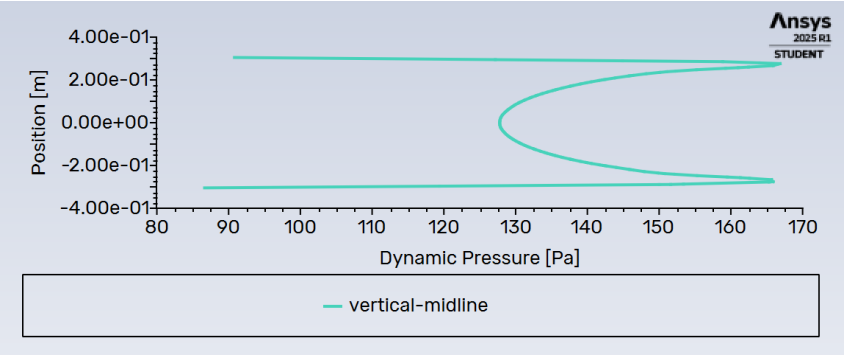
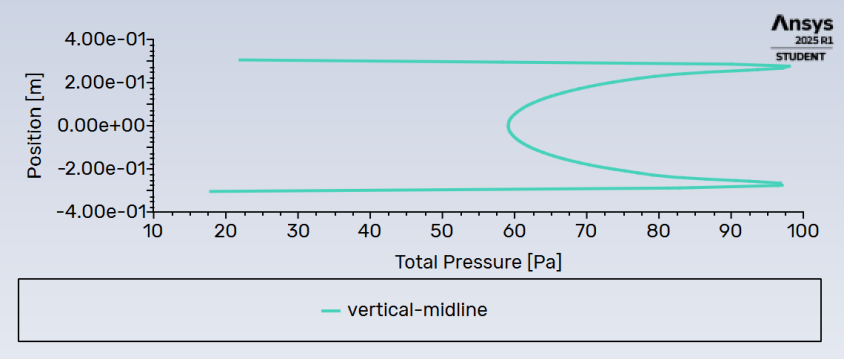


Figure 12: Vertical Distribution of Total Pressure



Part B:

Figure 13: Velocity Contour

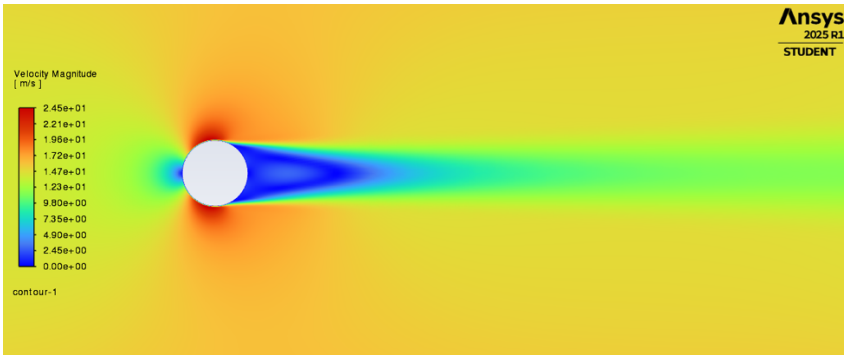


Figure 14: Pressure Contour

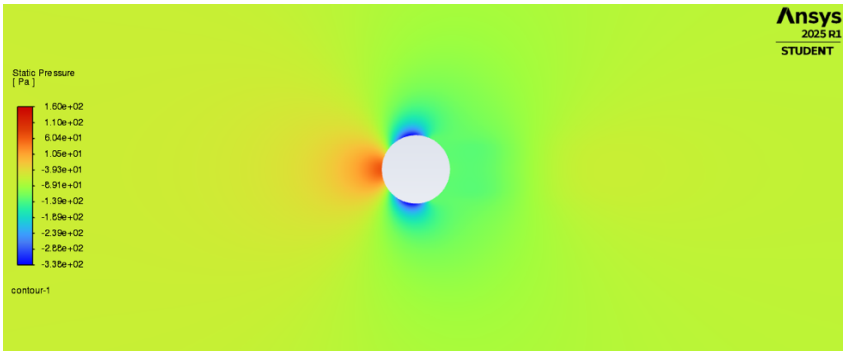
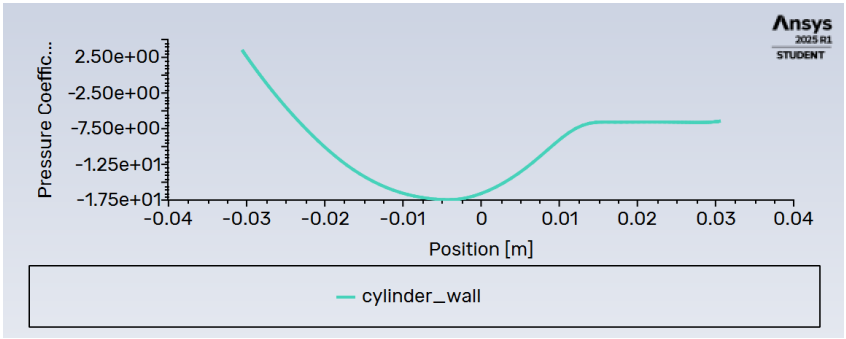


Figure 15: C_p (Pressure Coefficient) Distribution



Drag Coefficient of Circle:

$$C_D = \frac{F_D}{A\frac{\rho V^2}{2}} = 0.16471959$$

Part C:

Figure 16: Velocity Contour

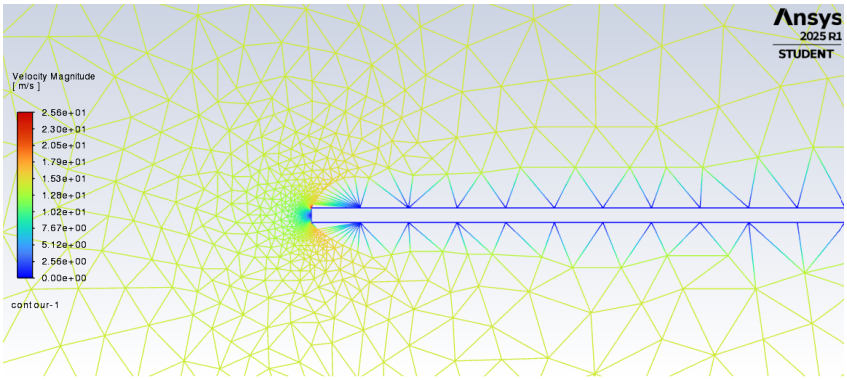


Figure 17: Pressure Contour

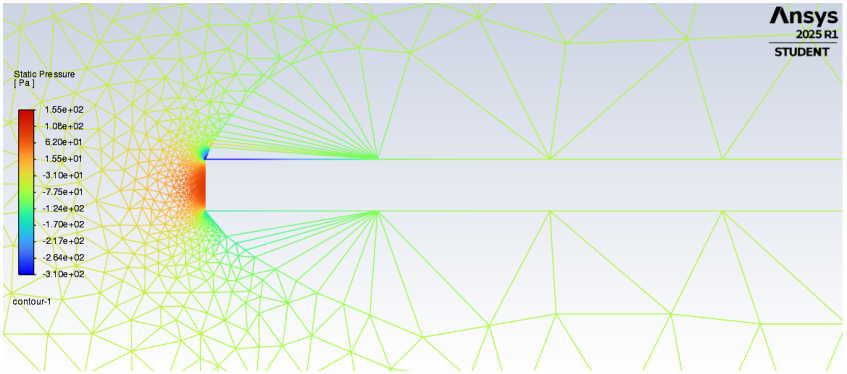


Figure 18: Wall Shear Distribution on the Surface of the Plate

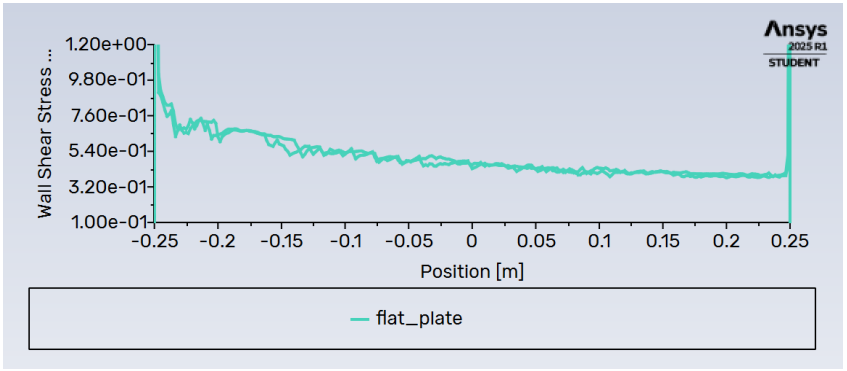
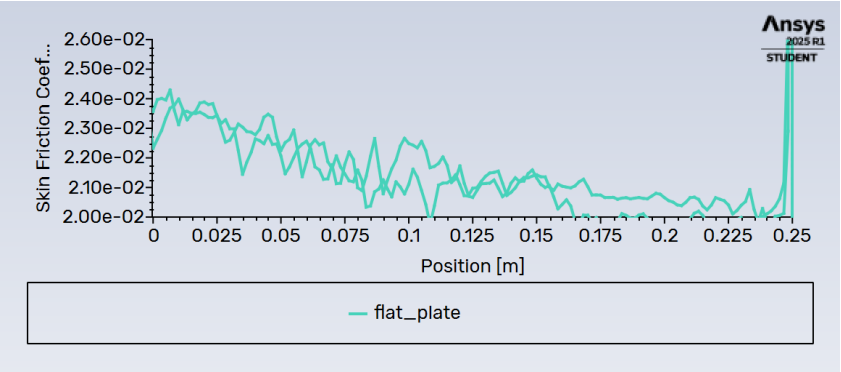


Figure 19: Skin Friction Coefficient Distribution on the Surface of the Plate



Drag Coefficient of the Flat Plate:

$$C_D = \frac{F_D}{A\frac{\rho V^2}{2}} = \mathbf{0.029464769}$$