Quiz 7: Boundary Layer Theory

November 6, 2025

Q1.- Consider a steady, incompressible, two-dimensional laminar flow of air (kinematic viscosity $\nu = 1.5 \times 10^{-5}\, m^2/s$) over a flat plate aligned with the flow direction. The freestream velocity is $U_\infty = 2\, m/s$. Answer the following questions:

1. Using the Blasius solution for a flat plate, determine the boundary layer thickness δ_{99} at a distance of $x = 0.5\, m$ from the leading edge of the plate.
2. Calculate the skin friction coefficient, C_f at a distance $x = 0.5\, m$
3. Determine the Wall Shear stress (τ_w) at $x = 0.5\, m$ if the air density is $\rho = 1.2\, kg/m^3$.