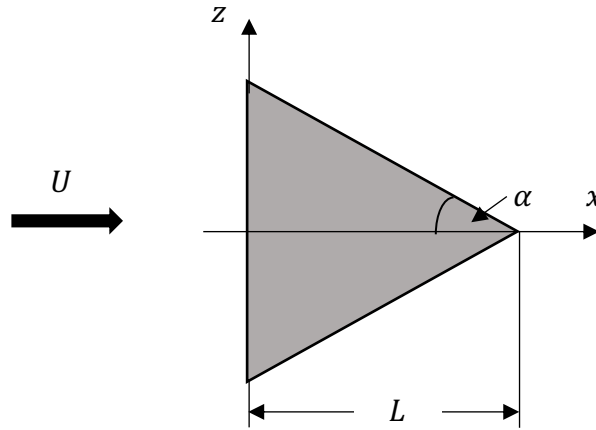


ME I0800: HW #6 Boundary Layer Theory

1. Ignoring edge effects determine the drag force over a flat isosceles triangle shown in the figure below where the equation of the upper side is given by

$$\frac{Z}{L} = \left(1 - \frac{x}{L}\right) \tan \alpha$$



2. Use a parabolic velocity profile to determine the boundary layer thickness in a uniform flow of air over a flat plate.
 - (a) Find the boundary layer thickness, δ , at $x = 10 \text{ cm}$ for a free stream velocity of 10 m/s .
 - (b) Determine the drag force on the plate and compare the result with Blasius Solution.
3. The free stream velocity is given by

$$U(x) = \frac{4}{11} \sqrt{x}$$

Assume a linear velocity profile inside the boundary layer and determine the drag force acting on the plate of length L .