ABE 307

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**Boundary Layer Velocity Profile**

Consider a flow of fluid over a flat plate. Far from the plate let us say that the flow is uniform with a constant velocity v∞. This is called: free stream velocity.

No slip condition, plate is stationary.

So, what is the fluid flow like over the plate?

Velocity increases from 0 to v∞ within the boundary layer (from y = 0 to y = ઠ)

Boundary Layer: The thin layer near the vicinity of the plate in which there is a velocity profile, after which the fluid flows with free stream velocity.

Why are we interested in velocity profile in boundary layer?

To be able to calculate the drag forces or shear forces of fluid on the solid object.

Dimension of problem?

2-dimensional problem again (vx, vy)

Planar flow

Assume steady state and incompressible fluid for simplicity

[draw the image]

Equation of continuity:

Equation of motion.