

2.20 Problem Set 5B

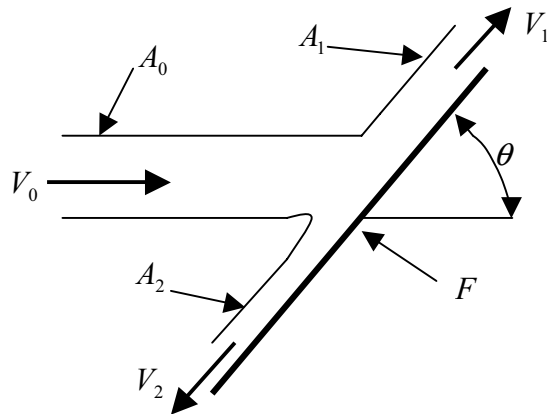
Name: _____

1. Supplementary Problem I2.

2. A fluid jet issues from a long vertical slot and strikes against a vertical flat plate at an angle. The resulting two-dimensional steady flow in a horizontal plane is shown below. The plate is frictionless.

(a) If the volume flow rate of a vertical section of the jet before it strikes the plate is $Q_0 = V_0 A_0$, where A_0 is the section area, find the flow rates Q_1 and Q_2 in terms of Q_0 . (Hint: think *Bernoulli*)

(b) Find the magnitude of the force F exerted on the vertical section of the plate.



Hint: Consider a coordinate system that makes momentum analysis easy.

3. Complete the following statements:

(a) The vorticity equation is derived from the _____ equation.

(b) In the case of inviscid flow, the time rate of change of vorticity following a fluid particle depends on vortex _____ and vortex _____, which in turn depend on the velocity gradients at the particle's location.

(c) The Bernoulli equation for steady, ideal flow is not valid for potential flow (TRUE or FALSE).