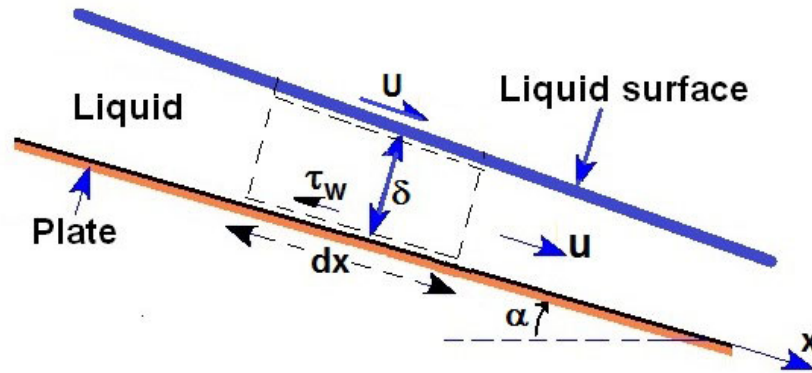


Problem 452A

A turbulent flow of liquid emerges from a slot forming a planar flow bounded on top by a free surface and on the bottom by an inclined solid base at an inclination α to the horizontal:



Assuming a velocity profile and wall shear stress similar to that for a turbulent boundary layer on a flat plate and neglecting the details of the flow in the immediate vicinity of the slot, determine the angle, α , at which the base must be set so that the thickness, δ , of the liquid is not increasing or decreasing with x , the distance along the base. The result should be given in terms of δ , ν (the kinematic viscosity of the liquid), ρ (the density of the liquid), g (gravity) and the velocity, U , on the free surface.