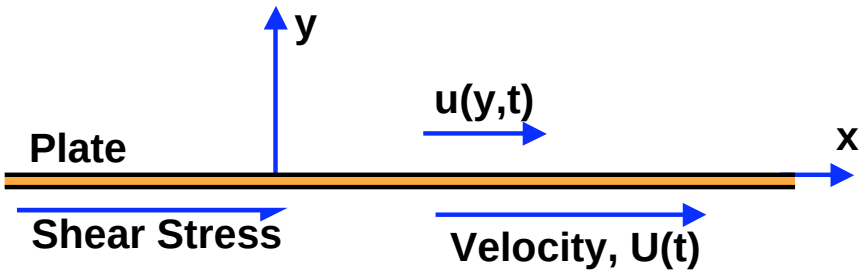
Problem 150B

An incompressible, Newtonian viscous fluid of density, ρ, and dynamic viscosity, μ, is bounded by an infinite flat plate :



The flat plate is given a velocity in its own plane; this velocity, U, increases with time, t , like

$$U(t) = U^* e^{kt}$$

where U^* and k are constants. By separation of variables (or otherwise) find the shear stress which must be applied to the plate in order to achieve this motion. The answer is in terms of k, U^*, ρ, μ and t.