CHE/ME 612-TRANSPORT PHENOMENA

Homework#1

Q1 Determine the steady state momentum flux $\tau_y$ at 70°C when the lower plate velocity in the following figure is 9 m/s in the +ve direction of x.

\[ v = 9 \text{ m/s} \]

\[ v_x(y) \]

\[ v_x(y,t) \]

\[ \text{Water at 1 atm} \]

Q2 Derive the generalized form of the Newton's Law of viscosity equation in vector-tensor notation.

\[ \tau = -\mu(\nabla v + (\nabla v)^+ + (2/3\mu - \kappa)(\nabla \cdot v))\delta \]

\[ Y = 0.05 \text{ m} \]