

5.16

Lumped Capacitance

T_i Initial chemical temp

T Chemical temp

T_∞ Steam temp

V Chemical Volume

A_s Surface Area of tube

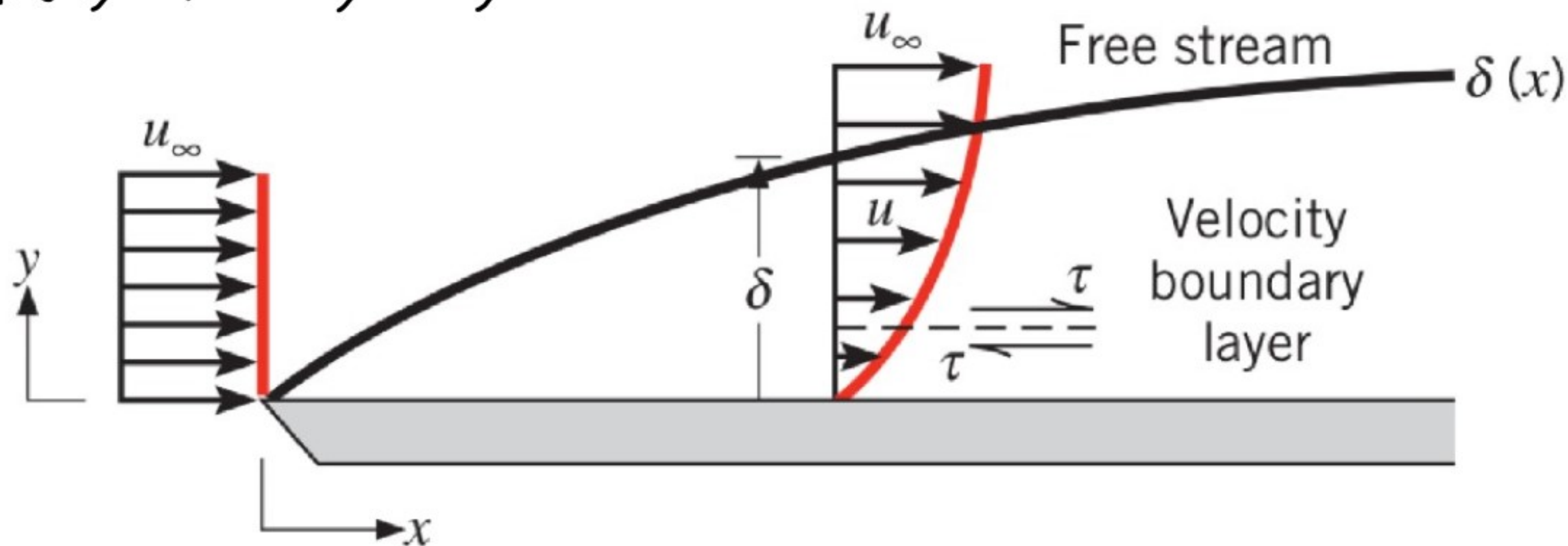
$$h = \frac{1}{\frac{1}{h_i} + \frac{1}{h_o}}$$

Convection

advection

conduction / diffusion

Velocity Boundary Layer

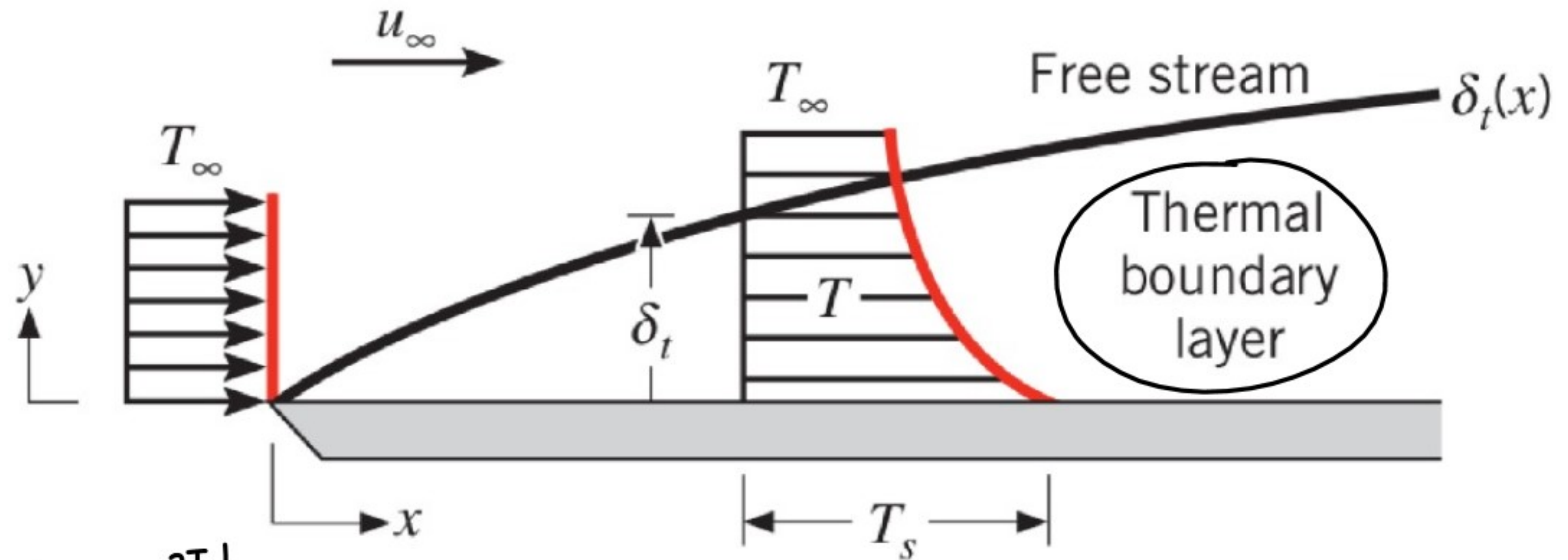


friction

$$C_f \equiv \frac{2\tau_s}{\rho u_\infty^2}$$

$$\tau_s = \mu \left. \frac{\partial u}{\partial y} \right|_{y=0}$$

μ viscosity



$$q_s'' = -k_f \left. \frac{\partial T}{\partial y} \right|_{y=0}$$

$$q_s' = h(T_s - T_\infty)$$

$$h = \frac{-k_f \left. \frac{\partial T}{\partial y} \right|_{y=0}}{T_s - T_\infty}$$

