



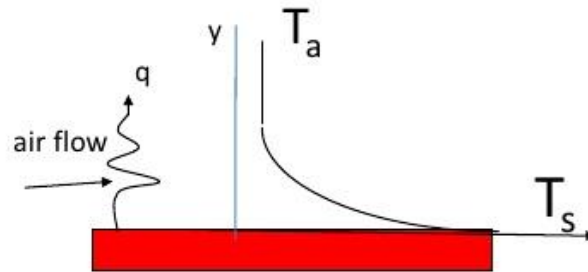
Convective Heat Transfer

Newton's Law of cooling

$$q'' = h_c(T_s - T_a)$$

$$q'' = \frac{(T_s - T_a)}{\frac{1}{h_c}}$$

$$R_c = \frac{1}{h_c}$$



where:

h_c is convection coefficient ($\text{W}/\text{m}^2\text{C}$),

T_s is surface temperature ($^{\circ}\text{C}$),

T_a is surrounding air temperature ($^{\circ}\text{C}$)

R_c = unit convective resistance.

Calculating the stream function

Given a velocity field: $\vec{V} = 2x \hat{i} - 2y \hat{j}$ $u = 2x$ $v = -2y$

Begin with u : $\frac{\partial \psi}{\partial y} \equiv u = 2x$

$$\partial \psi = u \partial y = 2x \partial y \quad \psi = 2xy + f(x)$$

Continue with v : $\frac{\partial \psi}{\partial x} \equiv -v = 2y$

$$\partial \psi = -v \partial x = 2y \partial x \quad \psi = 2xy + f(y) + C$$

Comparing the two expressions and choosing $C=0$: $\psi = 2xy$