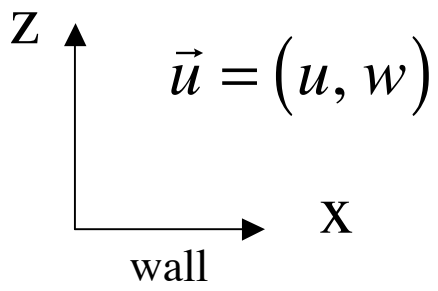
Flow Separation in 2-D Flow



$$\tau(x) = \mu\,\omega(x) = 0; \quad w = -\frac{1}{2}\frac{\partial\,\omega(x)}{\partial\,x}\,z^2 > 0$$

or equivalently, $\omega = 0; \quad \omega' < 0$

Flow Reattachment in 2-D Flow

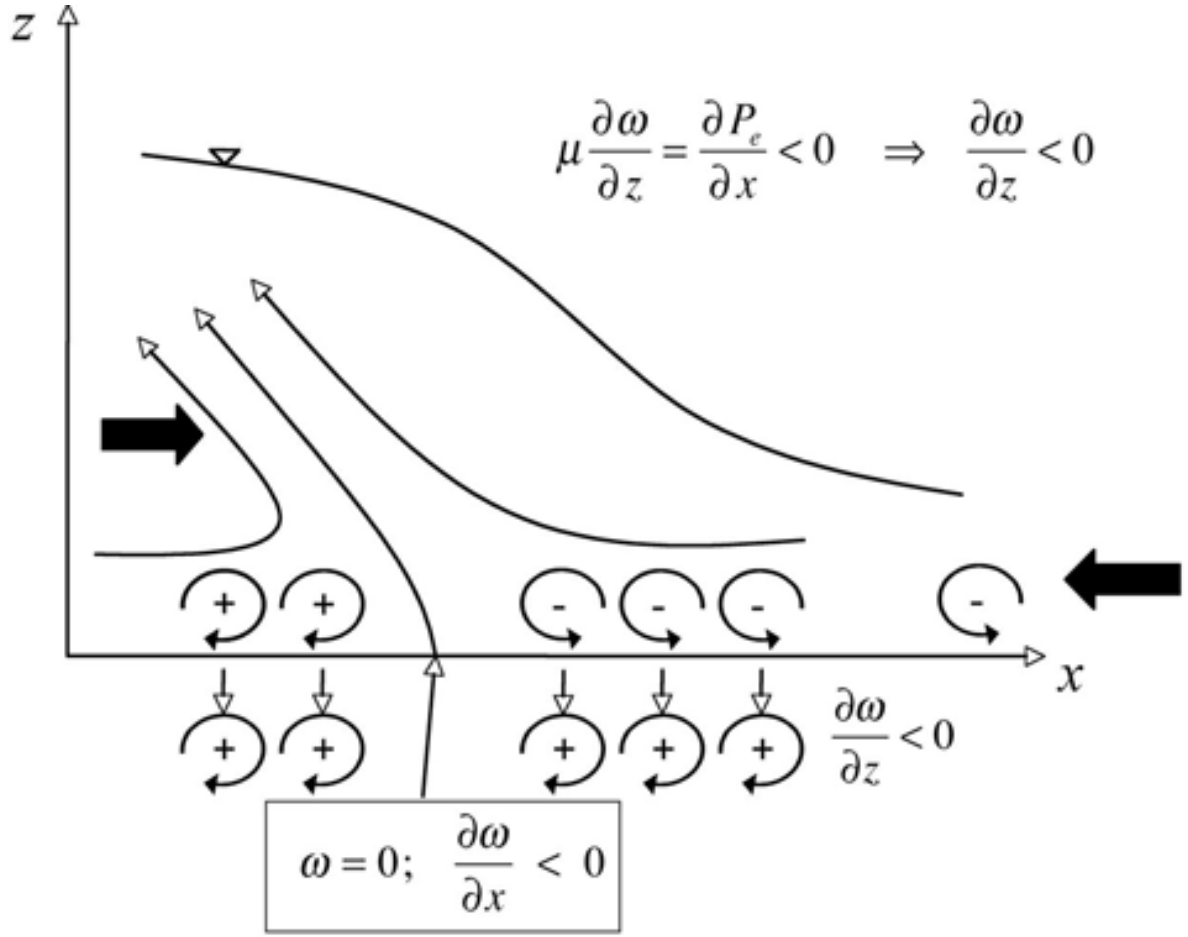
$$\omega = 0; \quad \omega' > 0$$

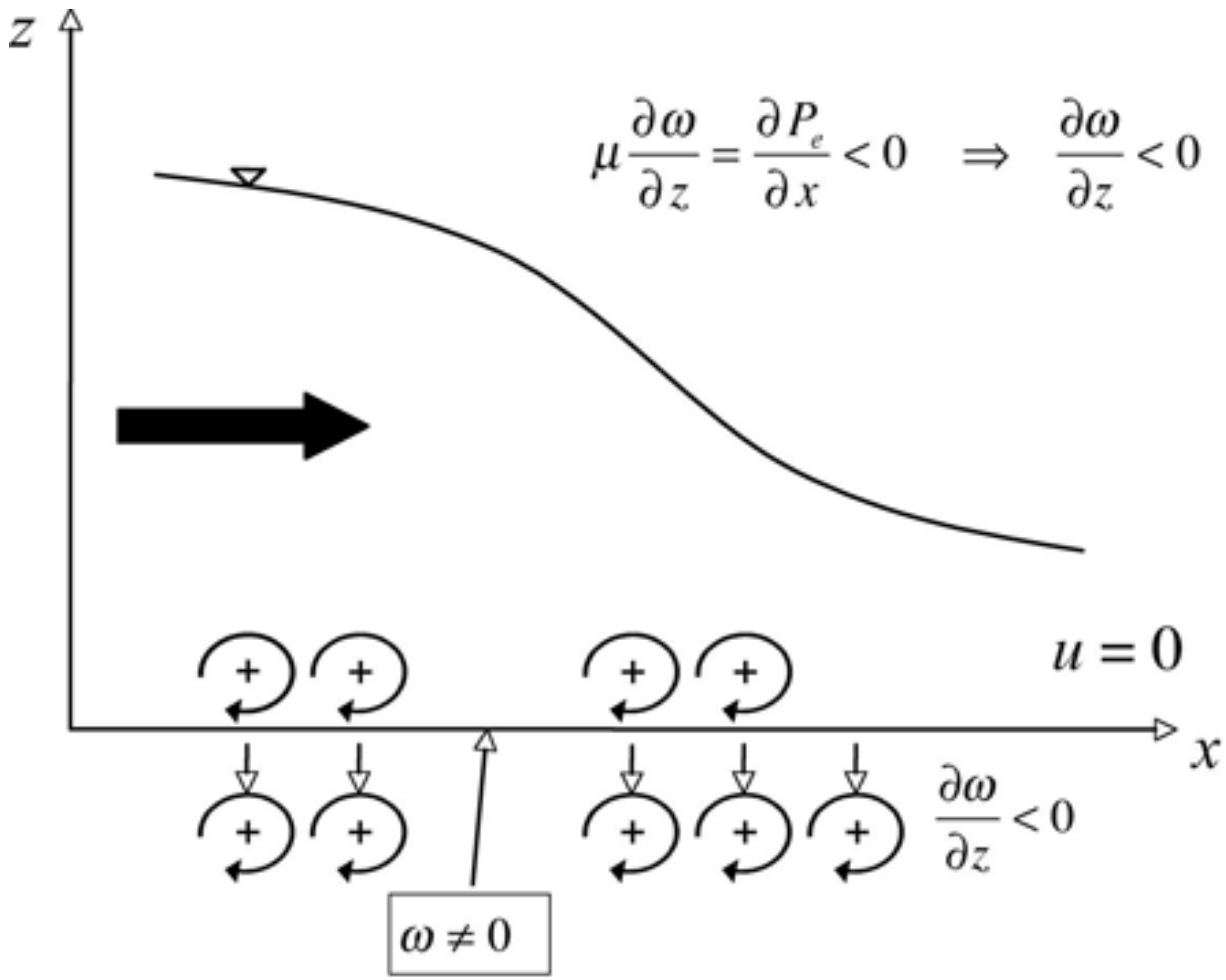
Vorticity Generation at a Solid Boundary

$$\mu\frac{\partial\,\omega}{\partial\,z} = \frac{\partial\,P_e}{\partial\,x}; \quad P_e = P + \rho\,g\,z$$

$$\tau_0 = \mu \frac{\partial u}{\partial z} = 0; \quad \omega = \frac{\partial u}{\partial z} = 0$$

$$w\left(x,z\right) = -\frac{1}{2}\frac{\partial \omega}{\partial x} z^2$$




z
$\mu \frac{\partial \omega}{\partial z} = \frac{\partial P_e}{\partial x} < 0 \quad \Rightarrow \quad \frac{\partial \omega}{\partial z} < 0$
$u = 0$
x
$\frac{\partial \omega}{\partial z} < 0$
$\omega \neq 0$