* The term $U_\infty \frac{dU_\infty}{dx}$ signifies space wise acceleration of the free stream. Existance of this term means that free stream pressure gradient is present in the flow direction.

* for flow over flat plate

$$U_\infty \frac{dU_\infty}{dx} = 0$$

$$\therefore \frac{d}{dx}\left[U_\infty^2 \delta^{**}\right] = \frac{\tau_w}{\rho}$$

SEPARATION OF BOUNDARY LAYER :-

- The flow is ~~reversed~~ reversed at the vicinity of the wall under certain conditions and the phenomenon is called seperation of boundary layer.
- Seperation takes place due to excessive momentum loss near the wall in a boundary layer trying move downstream against increasing pressure i.e $\frac{dp}{dx} > 0$, which is called adverse pressure gradient.
- In an infinite medium
  1. Up to $\theta = 90°$, the flow area is like constricted passage and the flow is like that of a nozzle.
  2. Beyond $\theta = 90°$, the flow area is diverged, therefore the flow behaviour is much showed by a jiten line.

Mathematically,

The point of seperation may be defined as the limit between forward and reverse flow in the layer very close to the wall, i.e at the point of seperation —

$$\left(\frac{\partial u}{\partial y}\right)_{y=0} = 0$$

At this point, the adverse pressure continues to exist and at the downstream of this point the flow acts in a reverse direction resulting in a ~~bla~~ back flow