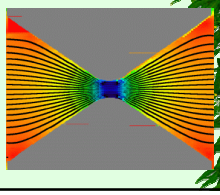
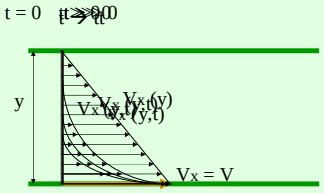
Bab I
Mekanisme Transfer Momentum

1. Hukum Newton tentang Viskositas
2. Viskositas
3. Fluida Non Newtonian



I.1. Hukum Newton tentang Viskositas



Pengamatan

- Gaya F untuk fluida tertentu
  Variabel berubah : A (luas plat) , y (jarak plat), V (kecepatan plat ditarik)

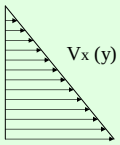
$$\frac{F}{A} \approx \frac{V}{y}$$

- Gaya F untuk fluida yang berbeda, A & V tetap

$$\frac{F}{A} = \mu \frac{V}{y}$$

$\frac{V}{y}$ = perubahan V utk stp perubahan jarak y

$t \rightarrow tt$



$$\frac{0-V}{y-0} \rightarrow \frac{dV}{dy}$$ negatif

Hukum Newton

$$\frac{F}{A} = \tau = -\mu \frac{dV}{dy}$$

τ = gaya/luas = flux momentum

= Kecepatan transfer momentum per satuan luas

I.2. Viskositas

Hukum Viskositas Newton $\tau_{yx} = -\mu \frac{dV_x}{dy}$

- τ_{yx} [=]dyne cm^{-2}
- V_x [=] cm det^{-1}
- y [=] cm

$\mu[=] \frac{\text{dyne cm}^{-2}}{\left(\frac{\text{cm det}^{-1}}{\text{cm}}\right)}$ [=]dyne det cm^{-2}

μ [=] g cm^{-1} det^{-1}

[=] poise

1 centipoise = 0,01 poise

Kinematik viskositas

$\nu = \frac{\mu}{\rho}$ → [=] $cm^2 det^{-1}$

I.3. Fluida Non Newtonian

- Model Bingham

$$\tau_{yx} = -\mu_o \frac{dV_x}{dy} \pm \tau_o$$

utk $\tau_{yx} > \tau_o$

utk $\tau_{yx} < \tau_o$, $dV_x/dy = 0$

- Model Ostwald de Waele

$$\tau_{yx} = -m \left|\frac{dV_x}{dy}\right|^{n-1} \frac{dV_x}{dy}$$