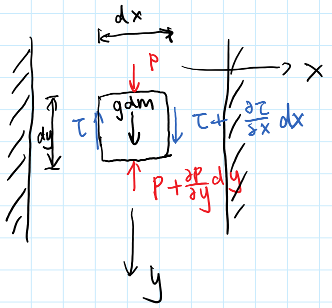
a) ges: y-KGG , $\tau(x)$, $v(x)$



$$\sum F_y = 0$$

$$\left(\cancel{p} - (\cancel{p} + \frac{\partial p}{\partial y}dy)\right) dx\,dz + \left(-\cancel{\tau} + \cancel{\tau} + \frac{\partial \tau}{\partial x}dx\right) dy\,dz + g\rho\, dx\,dy\,dz = 0$$

$$-\frac{\partial p}{\partial y}\, dy\,dx\,dz + \frac{\partial \tau}{\partial x}\, dx\,dy\,dz + g\rho\, dx\,dy\,dz = 0$$

$$-\frac{\partial p}{\partial y} + \frac{\partial \tau}{\partial x} + \rho g = 0$$

Bestimmung von $\tau(x)$ und $v(x)$:

$$\int \frac{\partial \tau}{\partial x}dx : \quad \tau(x) = \frac{\partial p}{\partial y}x - \rho g x + C_1$$

$$\frac{1}{\mu}\int \tau\, dx : \quad v(x) = \frac{1}{\mu}\frac{\partial p}{\partial y}\frac{x^2}{2} - \frac{1}{\mu}\rho g\frac{x^2}{2} + \frac{C_1 x}{\mu} + C_2$$

mit $v(a) = -V_0$, $v(-a) = 2V_0$

$$\frac{1}{\mu}\frac{\partial p}{\partial y}\frac{a^2}{2} - \frac{1}{\mu}\rho g\frac{a^2}{2} + \frac{C_1 a}{\mu} + C_2 = -V_0$$

$$\frac{1}{\mu}\frac{\partial p}{\partial y}\frac{a^2}{2} - \frac{1}{\mu}\rho g\frac{a^2}{2} - \frac{C_1 a}{\mu} + C_2 = 2V_0$$

$$\Rightarrow \begin{cases} C_1 = \dfrac{-3V_0\mu}{2a} \\ C_2 = \dfrac{V_0}{2} - \dfrac{a^2}{2\mu}\left(\dfrac{\partial p}{\partial y} - \rho g\right) \end{cases}$$

$$v(x) = \frac{1}{\mu}\frac{\partial p}{\partial y}\frac{x^2}{2} - \frac{1}{\mu}\rho g\frac{x^2}{2} + \frac{x}{\mu}\cdot\frac{-3V_0\mu}{2a} + \frac{V_0}{2} - \frac{a^2}{2\mu}\left(\frac{\partial p}{\partial y} - \rho g\right)$$

$$\tau(x) = \frac{\partial p}{\partial y}x - \rho g x - \frac{3V_0\mu}{2a}$$

b) ges: $v(0)$ wenn $\tau(\frac{a}{-2}) = 0$ und Verläufe $v(x)$, $\tau(x)$

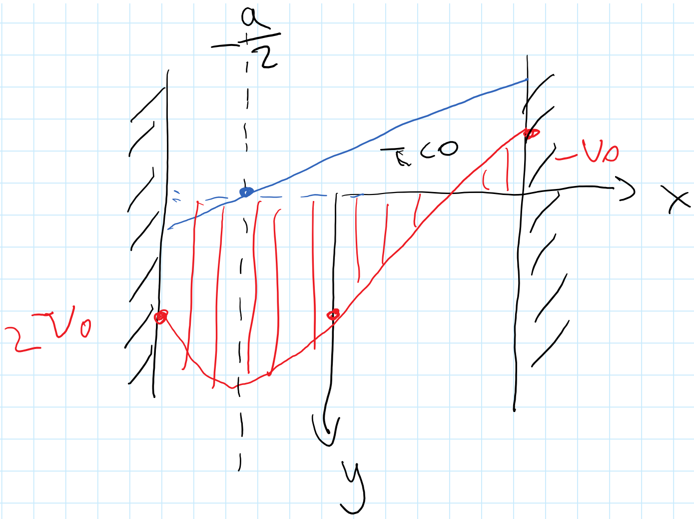
$$v(0) = \frac{V_0}{2} - \frac{a^2}{2\mu}\left(\frac{\partial p}{\partial y} - \rho g\right)$$

Bestimmung $\frac{\partial p}{\partial y}$ aus $\tau(\frac{a}{-2}) = 0$:

$$\tau\left(\frac{a}{-2}\right) = \frac{\partial p}{\partial y}\cdot\frac{a}{-2} + \rho g\frac{a}{2} - \frac{3V_0\mu}{2a} = 0$$

$$\frac{\partial p}{\partial y} = \rho g - \frac{3V_0\mu}{a^2}$$

$$v(0) = \frac{V_0}{2} - \frac{a^2}{2\mu}\left(\cancel{\rho g} - \frac{3V_0\mu}{a^2} - \cancel{\rho g}\right) = \frac{V_0}{2} + \frac{3V_0}{2} = 2V_0$$



$-\frac{a}{2}$
$-V_0$
$2V_0$
x
y