

geg

$$\vec{u}_{w0} = \Omega r \vec{e}_\varphi = -\vec{u}_{wu}$$

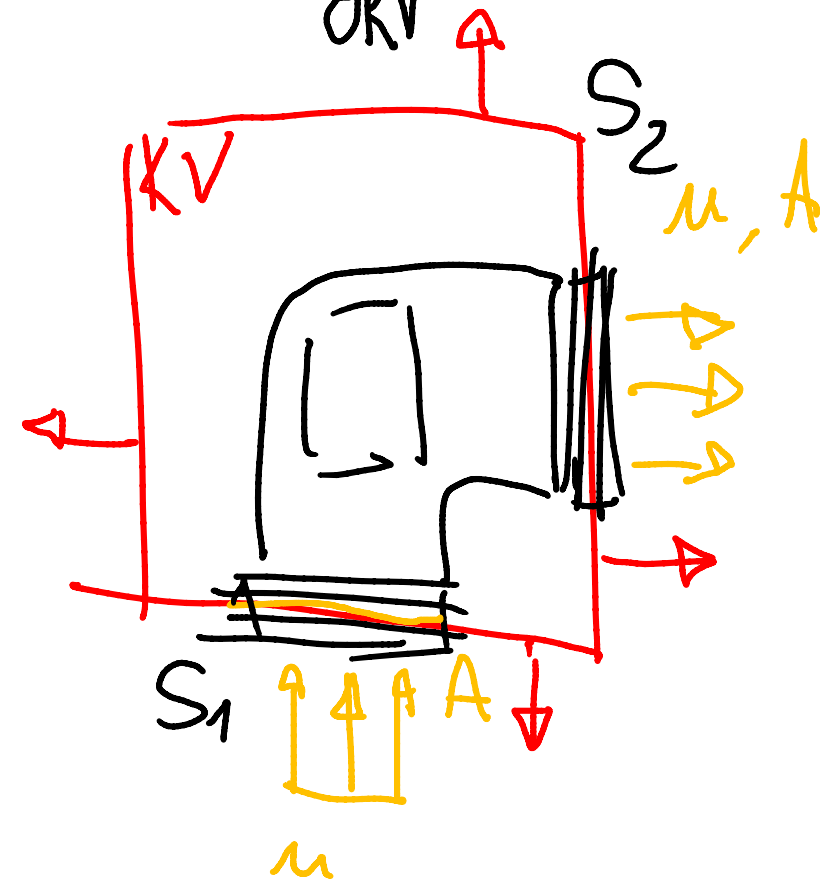
$$u_r = f(r) \cdot \cos \frac{\pi \varphi}{2\alpha}$$

$$f = \text{const}$$

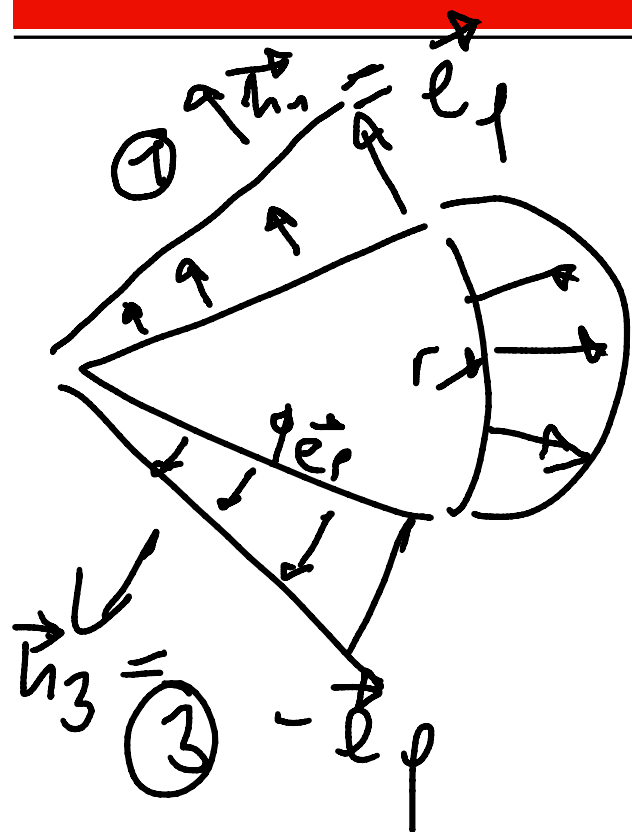


Beispiel:
Hydraulik-
Rohrbocke

$$\oint_{\partial KV} \vec{u} \cdot \vec{n} dS = \sigma$$



$$\int_{S_1} \vec{u} \cdot \vec{n} dS + \int_{S_2} \vec{u} \cdot \vec{n} dS = 0$$
$$-\mu A + \mu A = \sigma$$



②

$$\vec{n}_2 = \vec{e}_r$$

③

$$\int_0^r \underbrace{\rho r \vec{e}_\varphi \cdot \vec{e}_\varphi}_{r \text{ ③}} dr$$

$$+ \int_{-\alpha}^{+\alpha} \rho g(r) \cos \frac{\pi \varphi}{2\alpha} \vec{e}_r \cdot \vec{e}_r d\varphi$$

②

$$+ \int_0^r \underbrace{-\rho r \vec{e}_\varphi \cdot (-\vec{e}_\varphi)}_{\text{③}} = \sigma$$

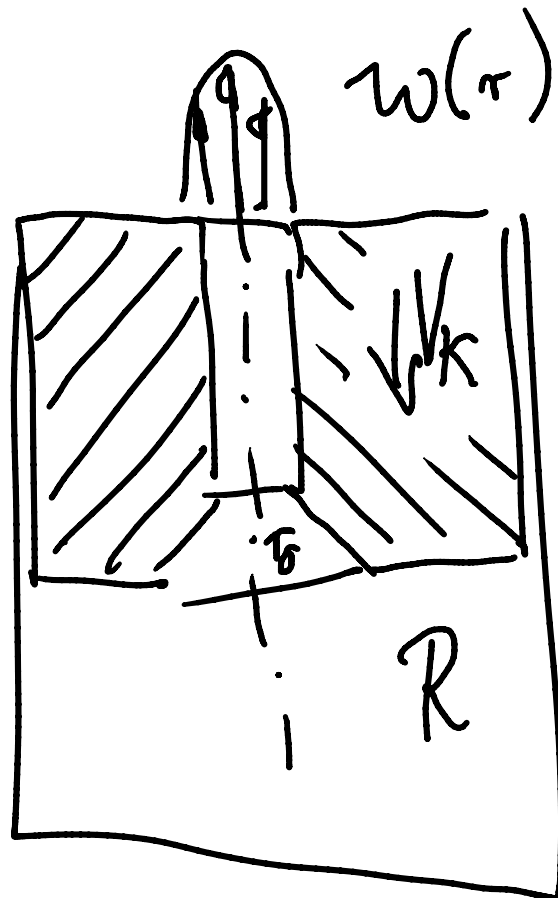


$$\textcircled{1} \int_0^r \Omega \bar{r} d\bar{r} = \frac{1}{2} \Omega r^2$$

$$\textcircled{2} \int_{-\alpha}^{+\alpha} f(r) \cos \frac{\pi y}{2\alpha} r dy = \int_{-\alpha}^{+\alpha} f(r) \left[\sin \frac{\pi y}{2\alpha} \right] \frac{2\alpha}{\pi} = \frac{4\alpha}{\pi} f(r) \cdot r$$

$$\Omega r^2 + \frac{4\alpha}{\pi} f(r) \cdot r = 0$$

$$f(r) = - \frac{\Omega r \pi}{4\alpha}$$



$$w(r) = W \left[1 - \left(\frac{r}{r_0} \right)^2 \right]$$

Kolben festes Koordinatensystem



$$\vec{e}_x \cdot \vec{e}_x = 1$$

$$a_x \cdot \vec{e}_y = 0$$



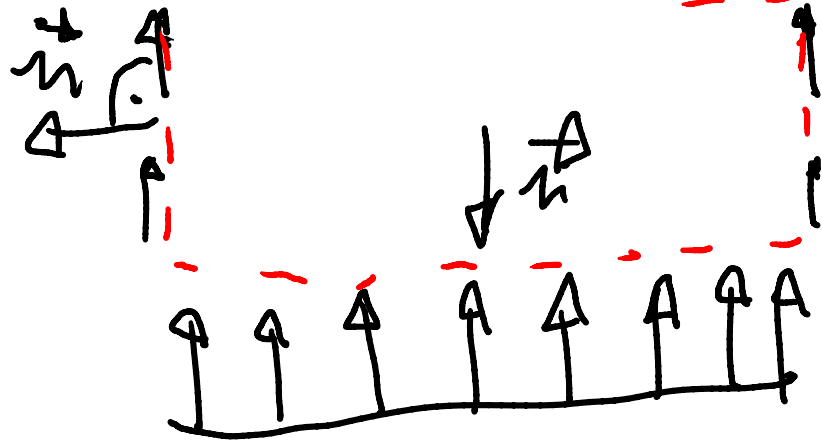
$$\int_0^{2\pi} \int_0^{r_0} W \left[1 - \left(\frac{r}{r_0} \right)^2 \right] r \, dr \, d\phi$$

dA

$$- \int_0^{2\pi} \int_0^R V_K r \, dr \, d\phi = 0$$

$$2\pi W \frac{r_0^2}{4} = \pi R^2 V_K$$

$$W = 2V_K \cdot \left(\frac{R}{r_0} \right)^2$$



2

Inertialsystem



$$\int_0^{2\pi} \int_0^{r_0} \omega \left[1 - \left(\frac{r}{r_0} \right)^2 \right] - V_K r dr d\varphi$$

$$\int_0^{2\pi} \int_{r_0}^R V_K r dr d\varphi = 0$$



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Einführung in die
Hydrodynamik
Vorrechenübung