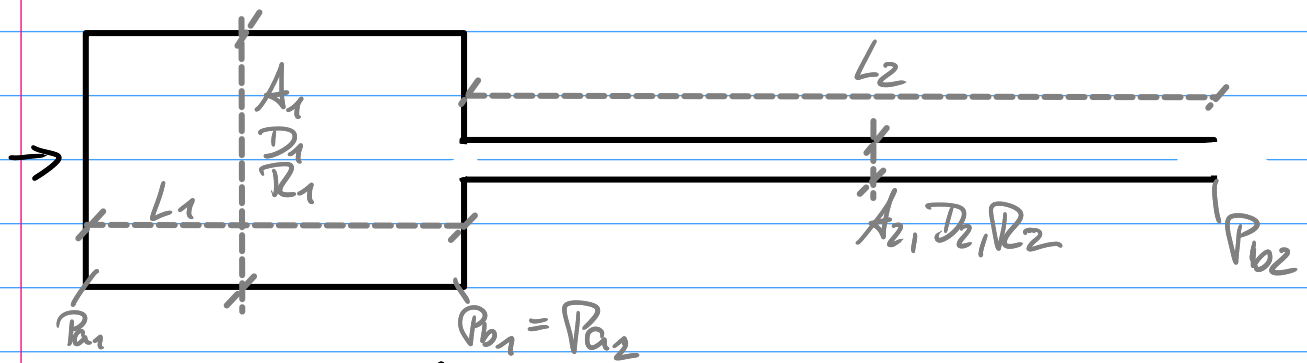
FD1 Kap 5, p. 25

Hagen-Poiseuille-Gesetz

$$\dot{V} = \frac{\pi}{8\eta} \frac{p_a - p_b}{L} R^4 \qquad \Delta p = p_a - p_b$$



⇒ umstellen für Zone 1

$$\Rightarrow \Delta p_1 = p_{a1} - p_{b1} = \frac{8\eta}{\pi} L_1 \frac{\dot{V}}{R_1^4}$$

umstellen f. Zone 2

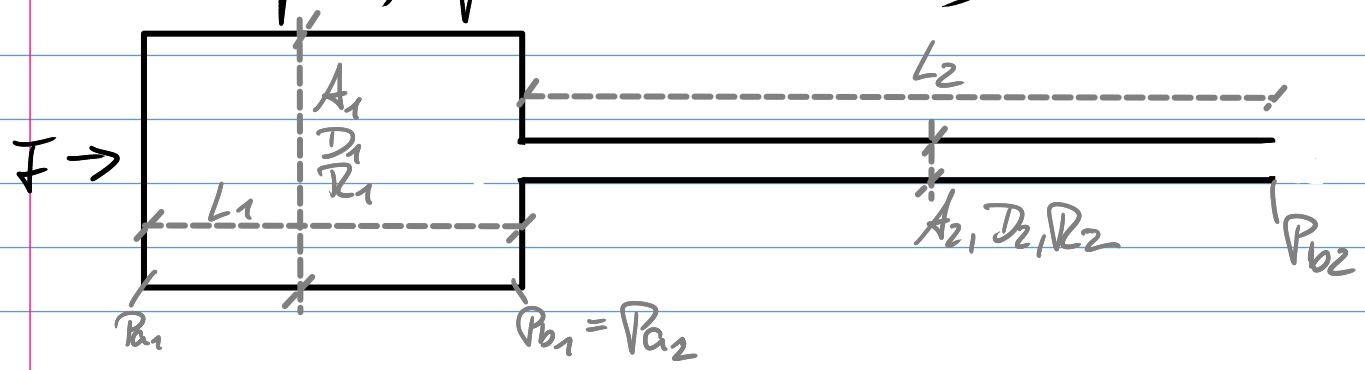
$$\Rightarrow \Delta p_2 = p_{a2} - p_{b2} = \frac{8\eta}{\pi} L_2 \frac{\dot{V}}{R_2^4}$$

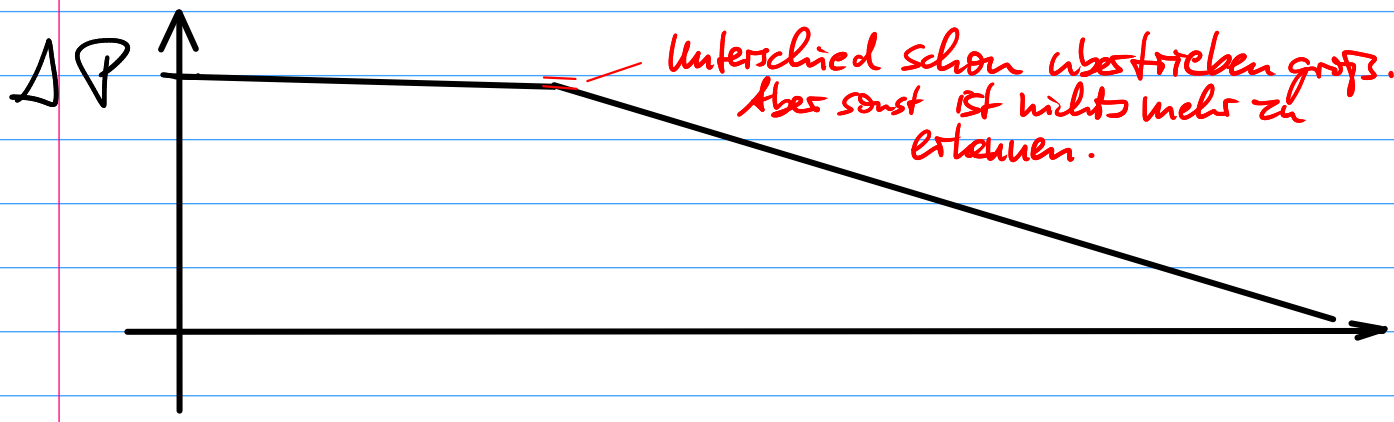
$\dot{V}$ für beide gleich

$$\Rightarrow \frac{\Delta p_1}{\Delta p_2} = \frac{L_1}{L_2} \frac{R_2^4}{R_1^4} \qquad \text{z.B. } R_1 = 10\, R_2$$

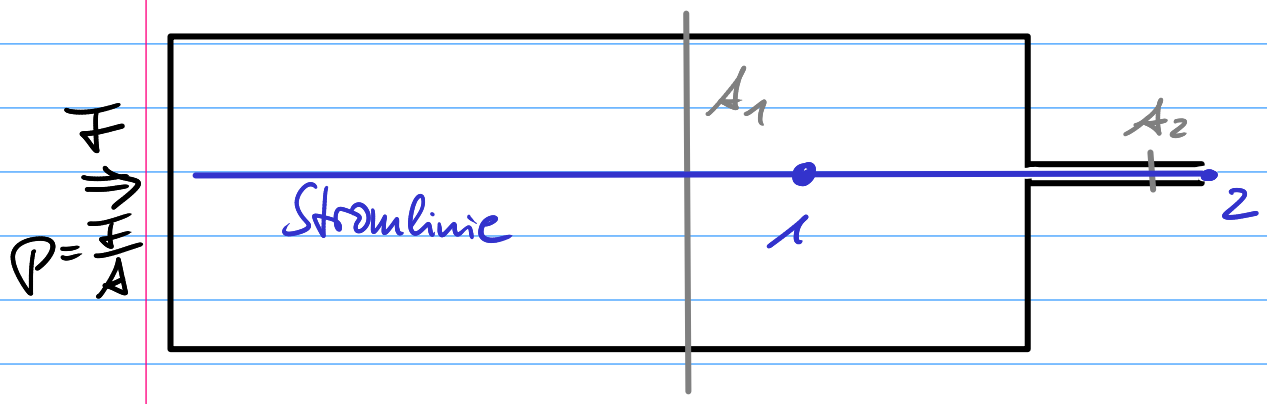
$$= \frac{L_1}{L_2} \frac{R_2^4}{10^4 R_2^4} = \frac{L_1}{L_2} \frac{1}{10000}$$

FD, Kap 5, p. 25 (cont'd)





Hochdruckreiniger



$A_1 \gg A_2$, $\dot{V}_1 = \dot{V}_2 \Rightarrow u_2 \gg u_1$

$\Rightarrow$ dynamischer Druck

Bernoulli: $p_0 + \frac{\rho}{2} u_2^2 = p_1 + \frac{\rho}{2} u_1^2$

$p_0 = p_2$

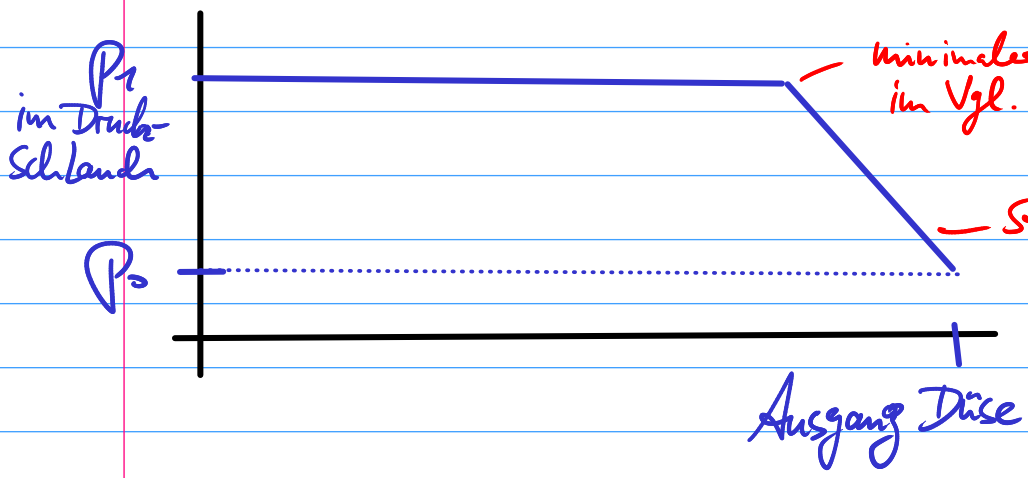
$\frac{\rho}{2} u_2^2$: Das ist das, was reinigt.

p_1: Kompressor

$\frac{\rho}{2} u_1^2$: klein im Vgl. zu

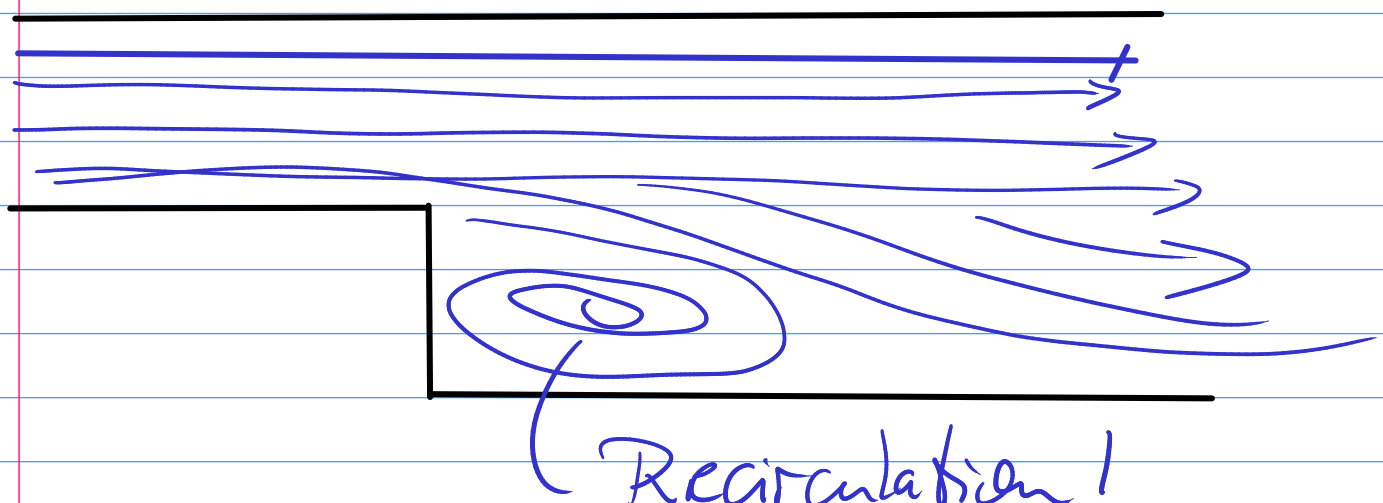
FD, Kap 5, p. 25 (cont'd)

Hochdruckreiniger



Anstieg des dynamischen Drucks durch Anstieg der Geschwindigkeit.

FCD, Backward facing step



Rezirkulation

Diffusor