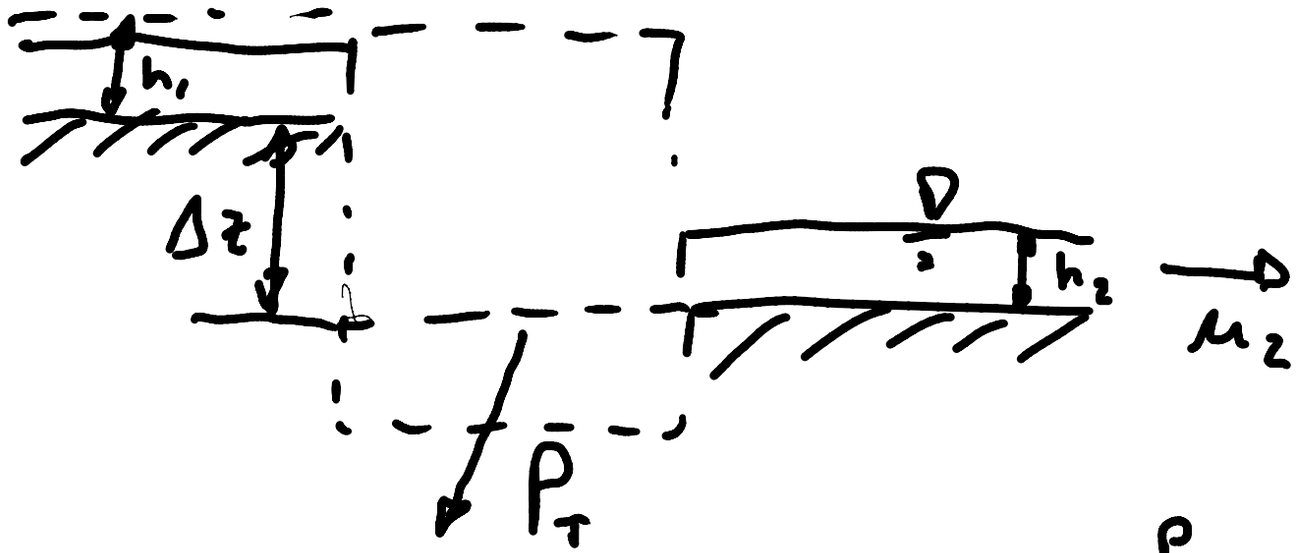
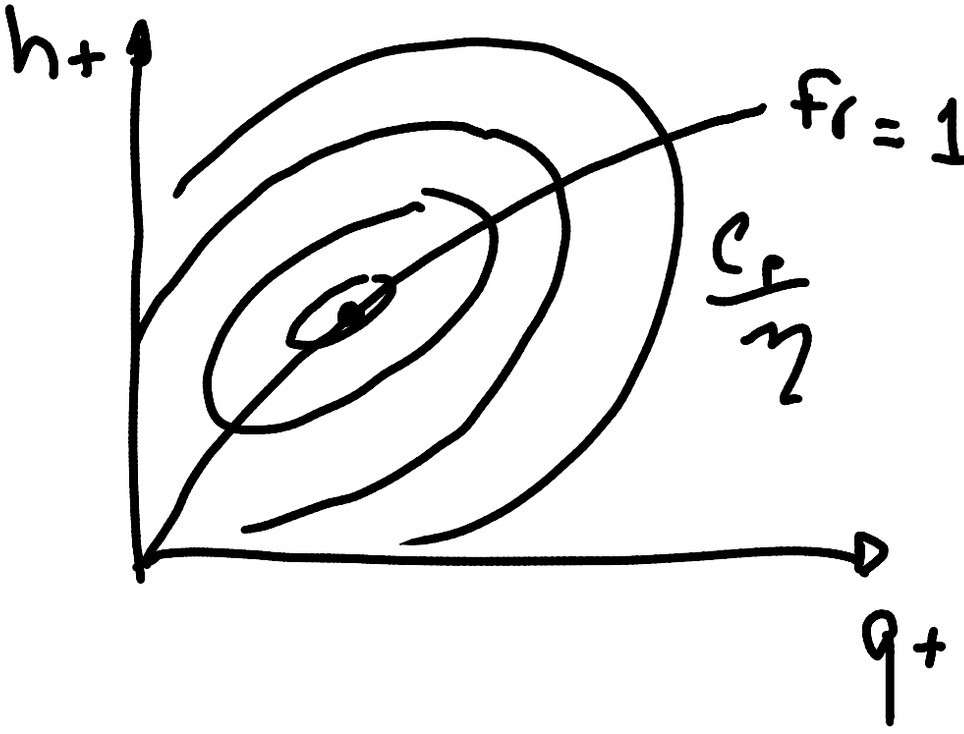


$$c_p = \frac{P_T}{P_{avail}}$$



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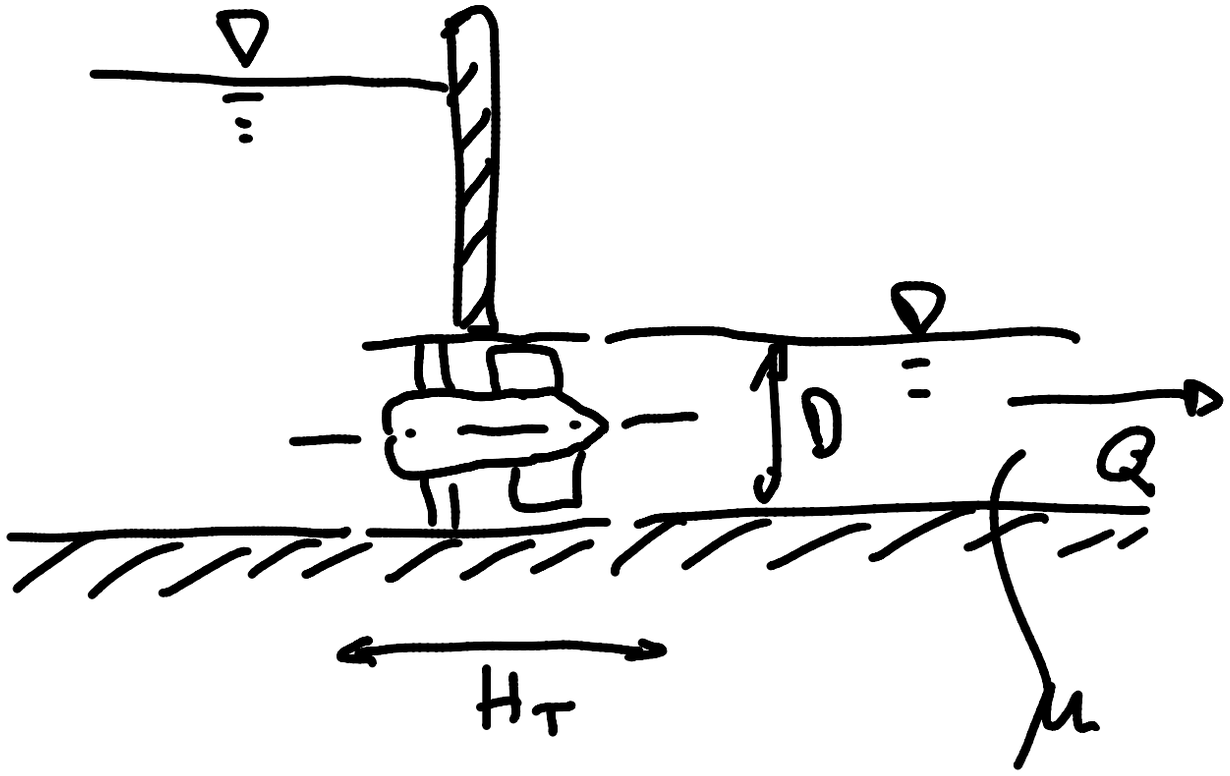
$$q_{20PT} = \left(\frac{2}{5} H_{eff}\right)^{3/2} g^{1/2} \qquad h_2 = \frac{2}{5} H_{eff}$$

$$Fr_2 = 1 \qquad H_{TOPT} = \eta \frac{2}{5} H_{eff}$$



D : Durchmesser
n : Drehzahl

$$\Delta p_t = \rho g H_T$$
$$= g H_T$$

$[D] = L \quad [n] = T^{-1} \quad [gH] = L^2 T^{-2}$

$[Q] = L^3 T^{-1} \quad [\mu] = L^2 T^{-1}$

Basisgrößensystem wählen:

	D	n	gH	Q	μ
L	1	0	2	3	2
T	0	-1	-2	-1	-1

	$D\,Q^{1/2}(gH)^{1/4}$	n	gH	Q	μ
L	0	0	2	3	2
T	0	-1	-2	-1	-1

	$n(gH)^{1/4}Q^{1/2}$	D
L	0	0	2	3	2	1
T	0	-1	-2	-1	-1	0

$$D_+ = f_n(\Pi_1, \Pi_2, \ldots)$$

$$2a + 3b = 1$$

$$D \quad -2a - b = 0$$

$$a = -\frac{1}{4}$$

$$b = \frac{1}{2}$$

	$D Q^{1/2} (gH)^{-1/4}$	$\frac{nd^2}{\nu} = Re$	$n (gH)^{1/4} Q^{-1/2}$
L	0	0	0
T	0	0	0

$$D \frac{\sqrt{Q}}{(gH)^{1/4}} = f_n \left(n \frac{(gH)^{1/4}}{\sqrt{Q}} , Re \right)$$

Spurk, Dimensionsanalyse

$$\delta = \frac{\sqrt{\pi}\,(2gH)^{1/4}}{2\sqrt{Q}}\,D$$: Durchmesserzahl

$$\sigma = \frac{2\sqrt{Q\pi}}{(2gH_T)^{3/4}}\,n$$: Schnellaufzahl

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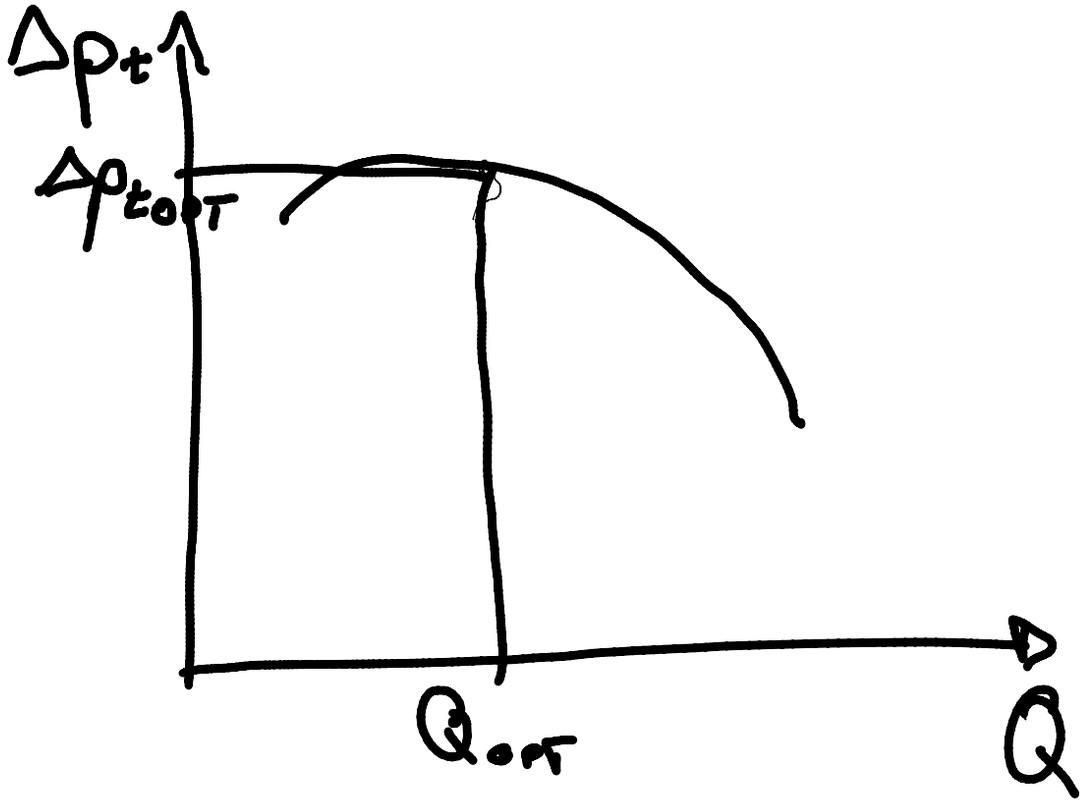
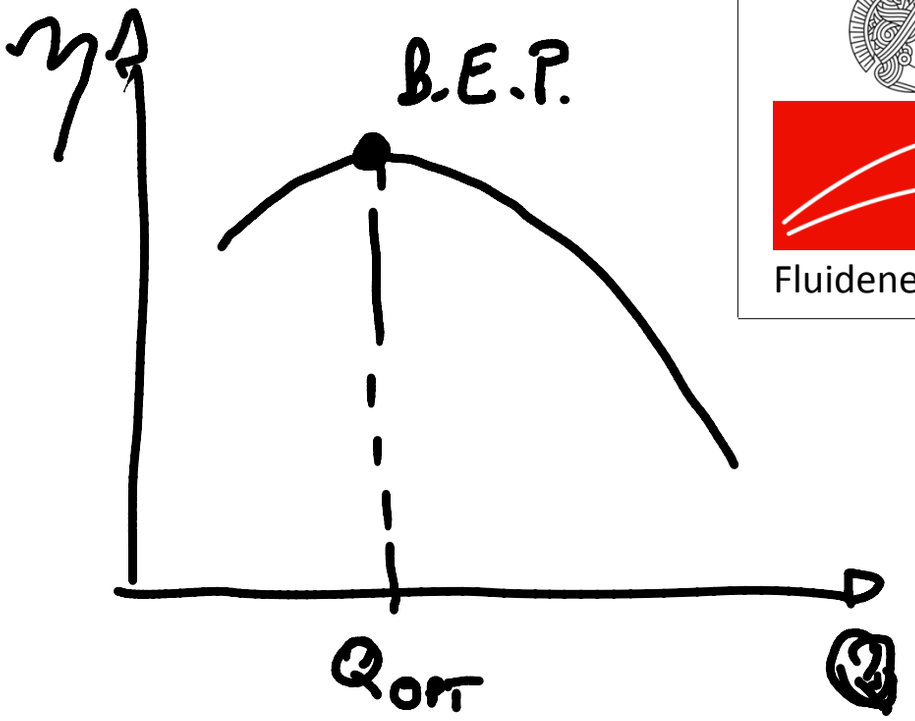
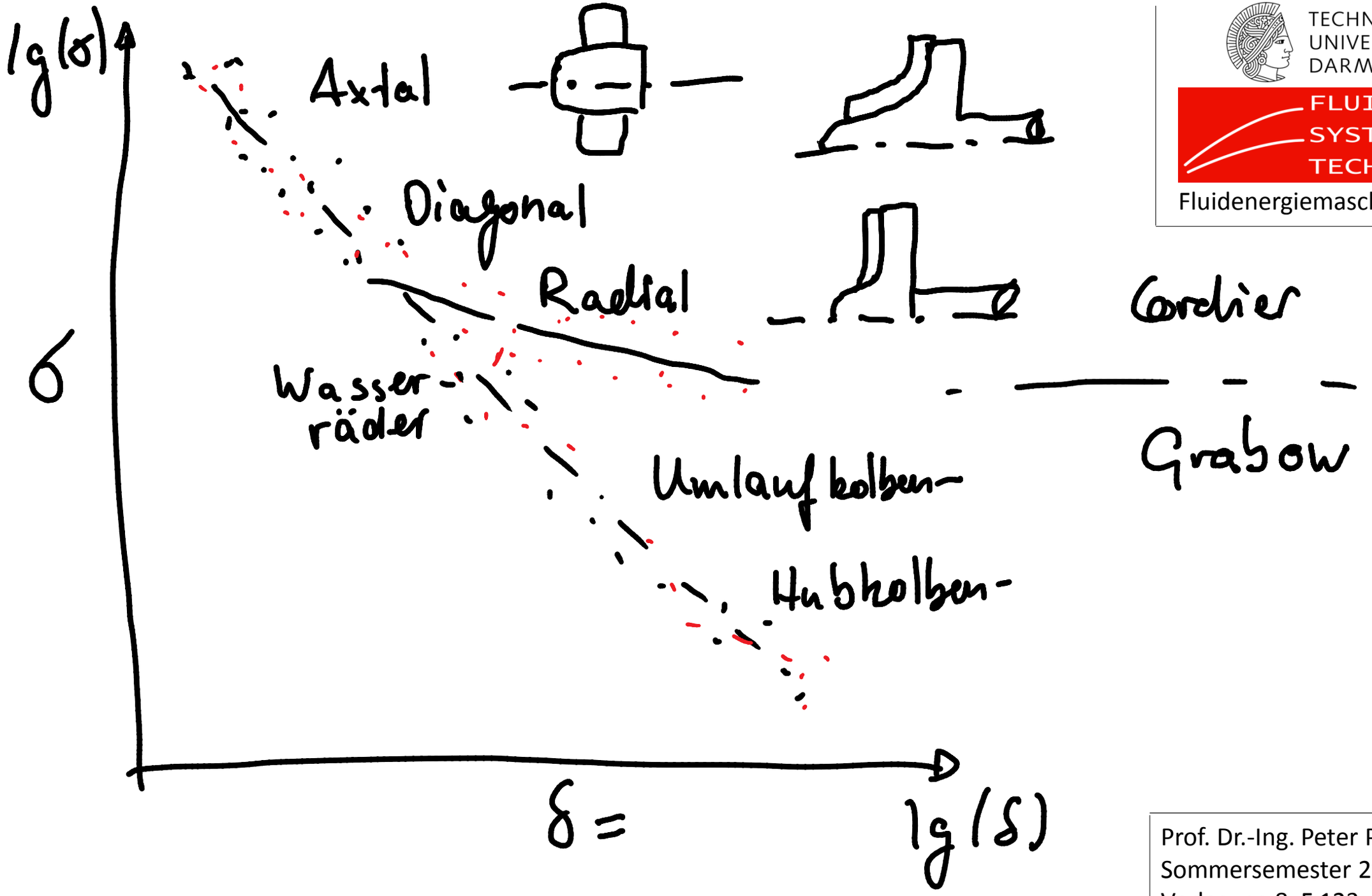
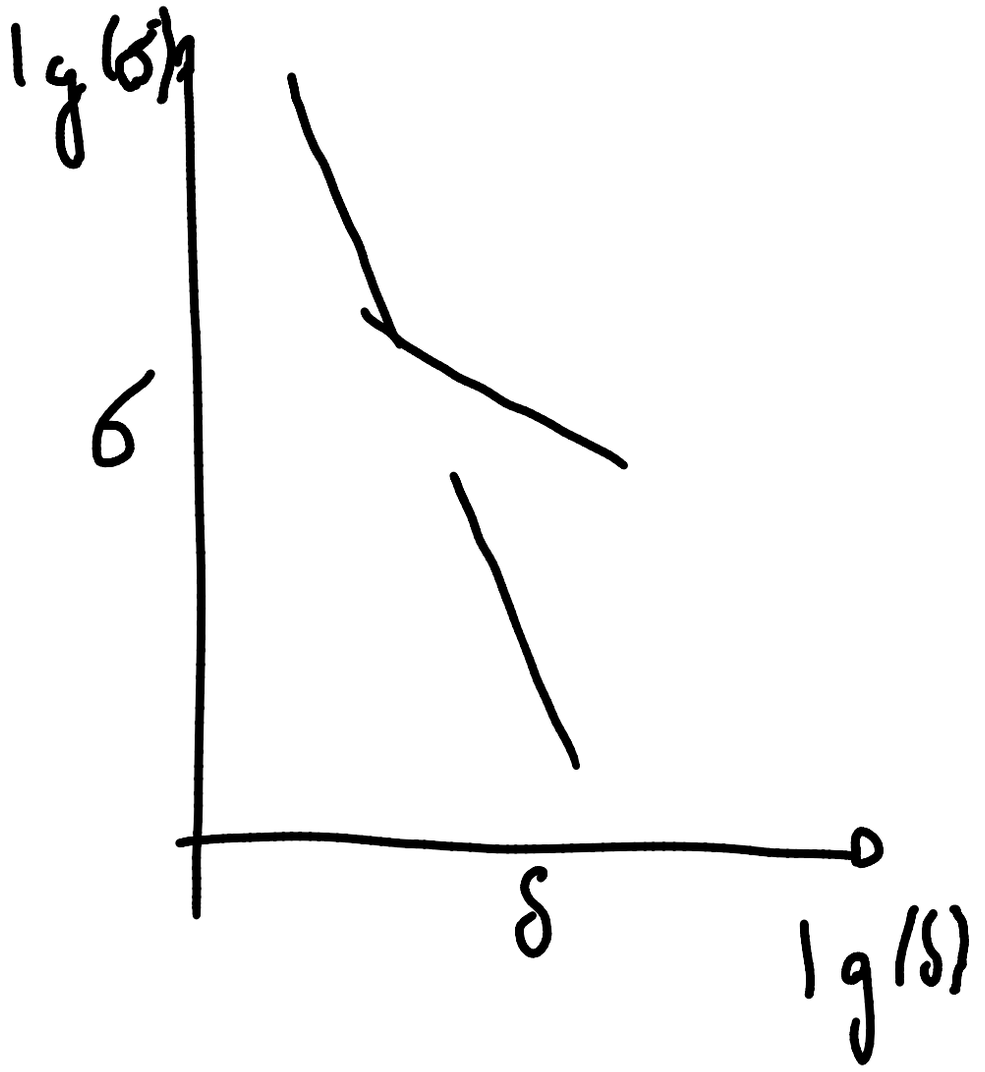

Δpt
Δpt opt
Q opt
Q


η
B.E.P.
Q opt
Q


lg(σ)
Axial
Diagonal
Radial
Cordier
σ
Wasser-
räder
Umlaufkolben-
Grabow
Hubkolben-
δ =
lg(δ)



$$\sigma = \frac{2\sqrt{Q\,\pi}}{(2g\,H_T)^{3/4}}\,n$$

$$\delta = \frac{\sqrt{\pi}\,(2g\,H_T)^{1/4}}{2\sqrt{Q}}\,D$$

I: Leistungsspez. Invest

K: Invest

P_N: Nutzleistung

$$I = \frac{K}{P_N}$$

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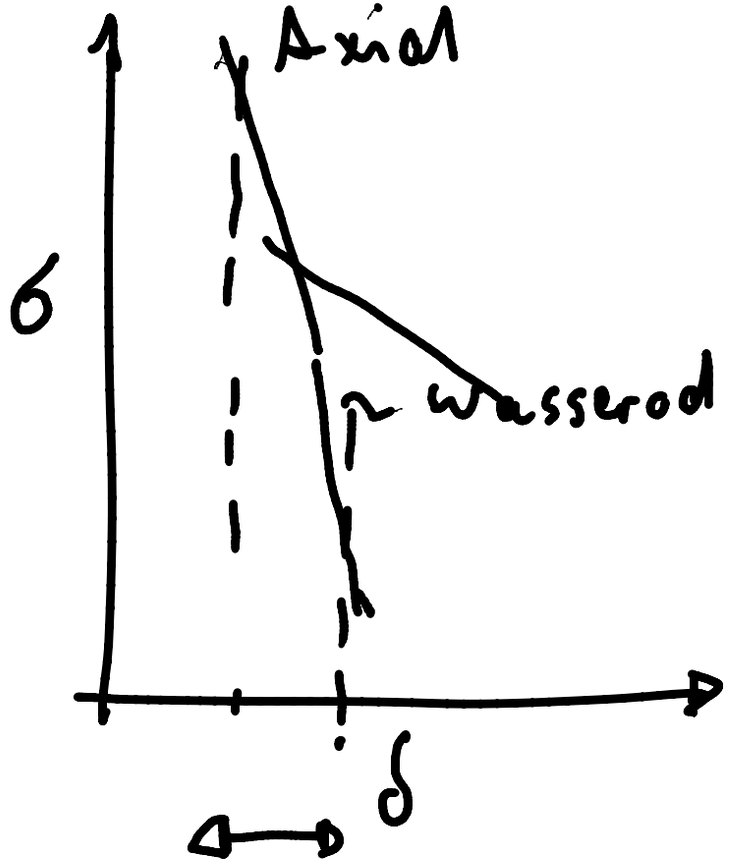

$$D_W = \delta_{WR} \frac{2\sqrt{Q}}{\sqrt{n}\,(2g\,H_t)^{1/4}}$$

$$D_{AX} = \delta_{AX} \frac{2\sqrt{Q}}{\sqrt{n}\,(2g\,H_t)^{1/4}}$$

$$\frac{D_{WR}}{D_{AX}} = \frac{\delta_{WR}}{\delta_{AX}}$$

$$K \sim C \cdot D^3$$

$$\frac{D_{WR}}{D_{AX}} = \frac{10'}{10^0} = 10$$

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$\frac{K_{wr}}{K_{ax}} \approx 1000$