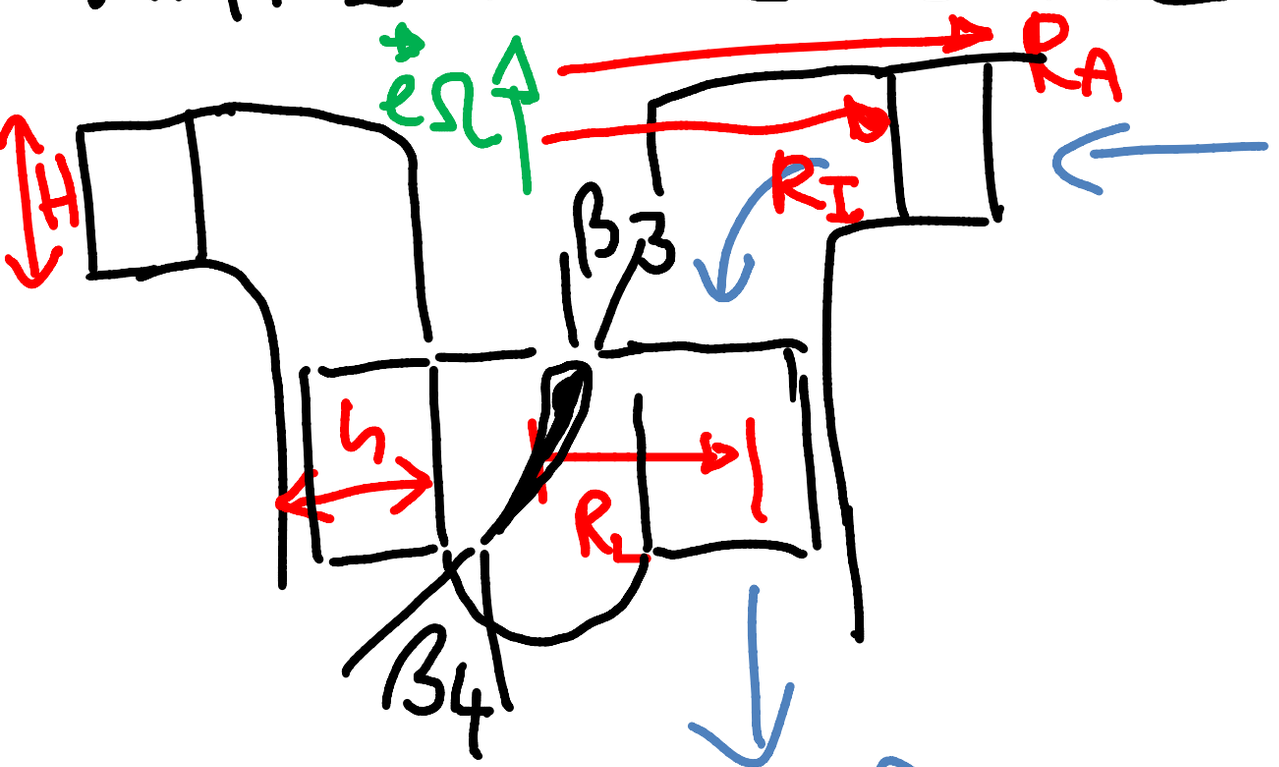
KAPLANTURBINE



TECHNISCHE UNIVERSITÄT DARMSTADT

FLUID SYSTEM TECHNIK

Einführung in die Hydrodynamik

Vorrechenübung

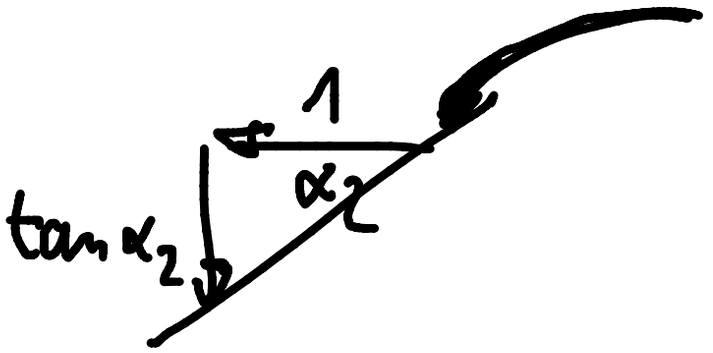
Prof. Dr.-Ing. Peter Pelz

Sommersemester 2012

Übung 7 F 42

$$\vec{c}_1 = -\frac{Q}{2\pi R_a H}\vec{e}_r$$

$$\vec{c}_2 = -\frac{Q}{2\pi R_I H}\vec{e}_r + \frac{Q\tan\alpha_2}{2\pi R_I H}\vec{e}_\varphi$$



$r_2 c_{u2} - r_3 c_{u3} = 0$ Turbinengleichung Drallerhaltung

$$\rightarrow c_{u3} = \frac{Q\tan\alpha_2}{2\pi R_L H}$$

$$c_{3\Omega} = -\frac{Q}{2\pi R_L h}$$

$$M = \dot{m}\left(c_{u3} R_L - c_{u4} R_L\right)$$

$$M = \rho Q \frac{Q \tan\alpha_2}{2\pi R_L H} R_L = \rho \frac{Q^2 \tan\alpha_2}{2\pi H}$$

$$P_T = \vec{M} \cdot \vec{\Omega} = \rho \frac{Q^2 \Omega \tan\alpha_2}{2\pi H}$$

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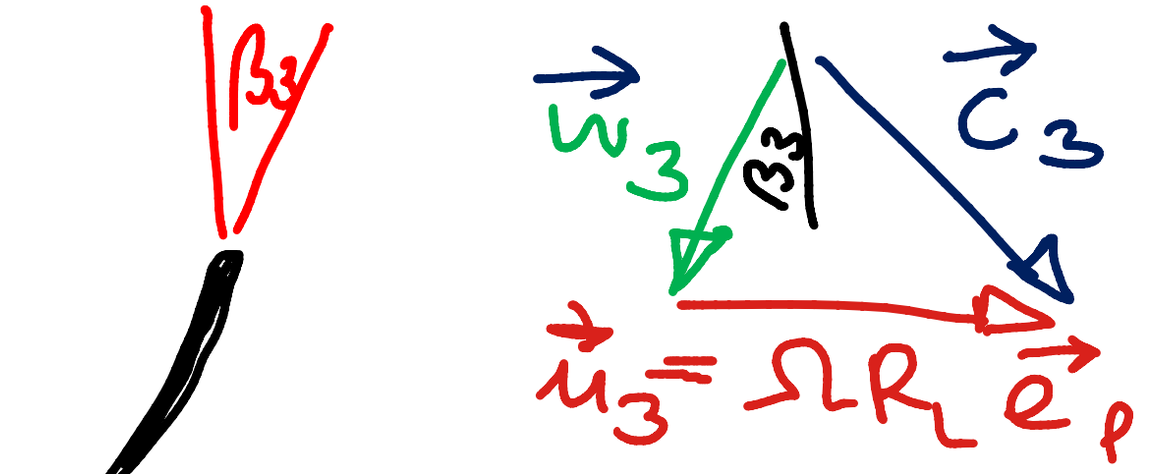
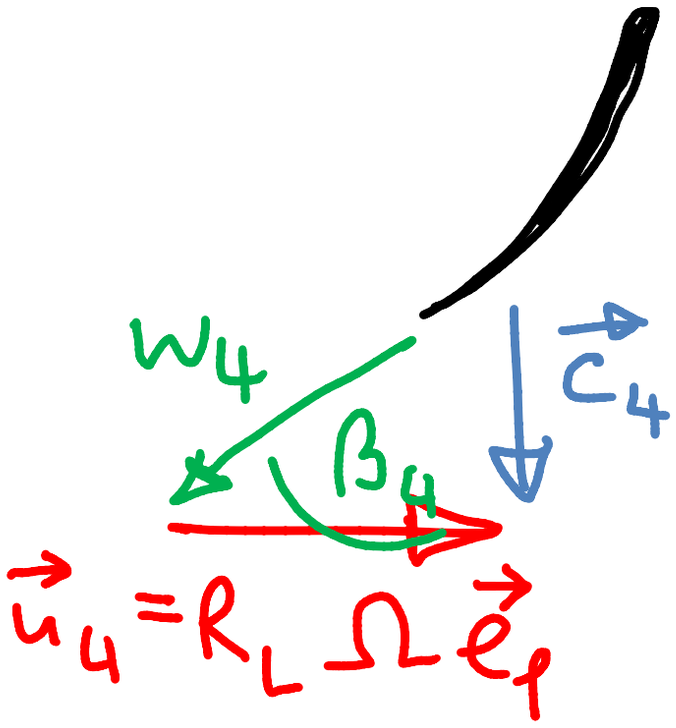


$$\tan\beta_3 = \frac{w_{m3}}{|w_{\Omega 3}|} = \frac{\dfrac{Q\tan\alpha_2}{2\pi R_L H} - \Omega R_L}{\dfrac{Q}{2\pi R_L h}}$$

$$= \frac{h}{H}\tan\alpha_2 - \frac{2\pi R_L^2 h\,\Omega}{Q}$$



$$\tan\beta_4 = \frac{|u_4|}{|c_4|}$$

$$= \frac{\Omega R_L}{\frac{Q}{2\pi R_L h}}$$

$$\tan\beta_4 = \frac{2\pi R_L^2 h \Omega}{Q}$$