MERENJA U HIDROTEHNICI

Vežba br. 2.2

Merenje protoka na Thompson-ovom prelivu

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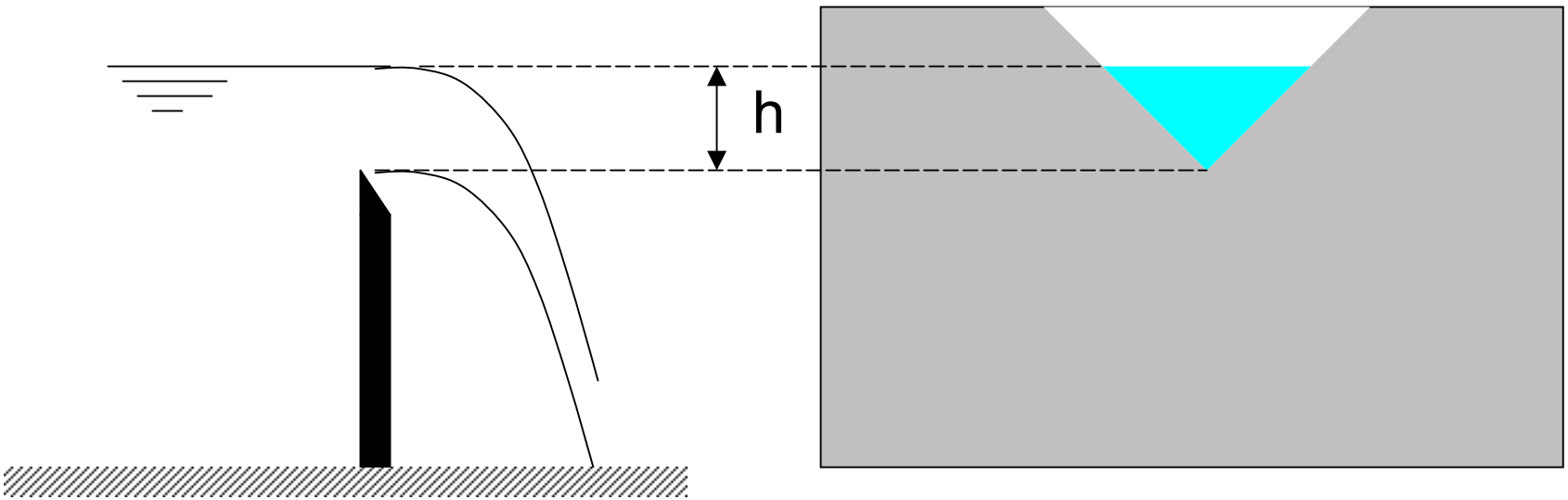
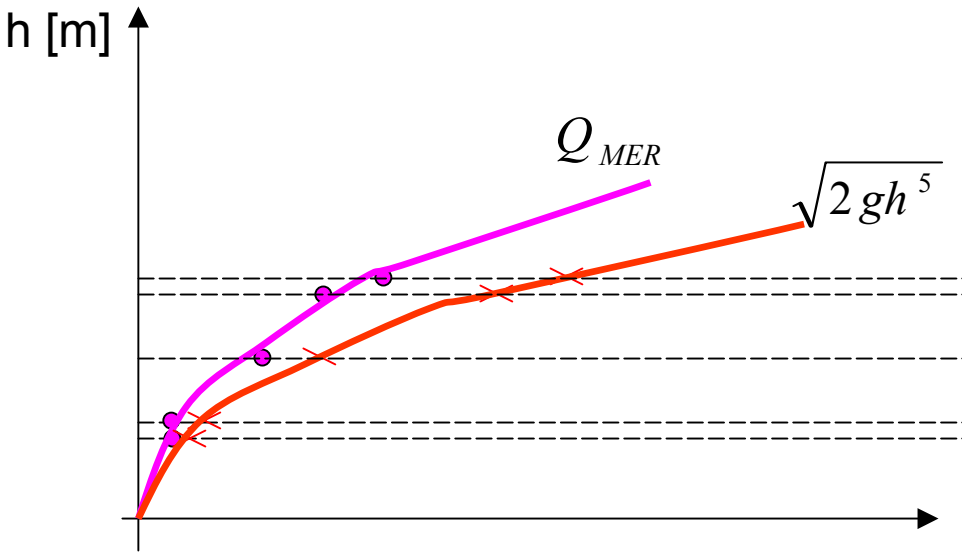
Uvod

Tompsonov preliv!!

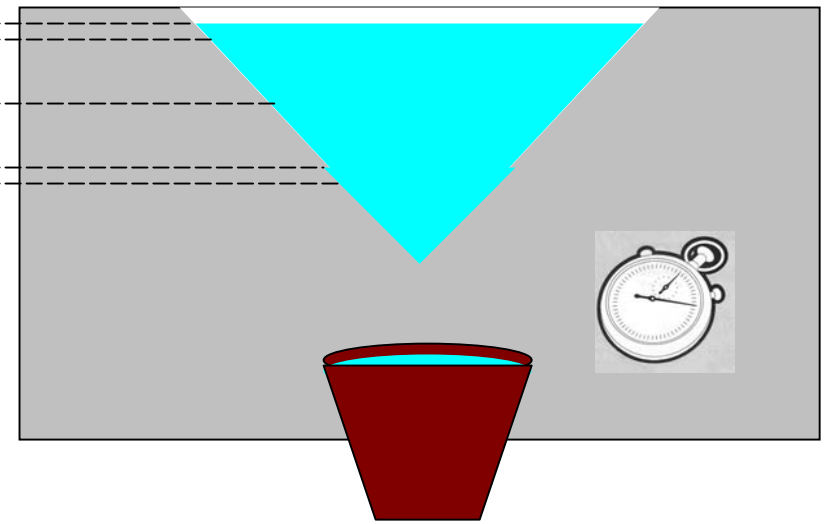
$$Q = C_Q \sqrt{2gh^5}$$



Kako naći C_Q?



$$Q_{MER} = C_Q \sqrt{2gh^5}$$



h	Q_{MER}	$\sqrt{2gh^5}$

$$Q_{MER} = \frac{\Delta V}{\Delta t} \quad , \quad \Delta V = \frac{\Delta M}{\rho} \quad \Rightarrow \quad Q_{MER} = \frac{\Delta M}{\rho \Delta t}$$

Prvi autor

1. $Q = C_Q \sqrt{2gh^5}$

$$C_Q = 0.581 \frac{8}{15}$$

C_Q ne zavisi od visine h!!

Drugi autor

3. $$Q^* = C_Q \sqrt{2g(h^5 + k_v)}$$

$$k_v = 0.001\ m$$

$$C_Q^* = 0.581 \frac{8}{15}$$

C_Q ne zavisi od visine h!!

Treći autor

2. $Q^{**} = C_Q \sqrt{2gh^5}$

$$C_Q^{**} = \left[0.3 + \frac{0.375}{(\mathrm{Re}\,We)^{0.167}} \right] \cdot \sqrt{2g}$$

$$Re = \frac{h\sqrt{gh}}{\nu} \qquad We = \frac{\rho g h^2}{\sigma}$$

C_Q zavisi od visine h!!

Greške

Greška merenja:

$$\varepsilon_1 = \frac{Q_{MER} - Q_T}{Q_T} 100\%$$

$$\varepsilon_2 = \frac{Q_{MER} - Q_T^*}{Q_T^*} 100\%$$

$$\varepsilon_3 = \frac{Q_{MER} - Q_T^{**}}{Q_T^{**}} 100\%$$

Neodređenost

•Neodređenost za računat protok ako uzmemo u obzir samo neodređenost očitane visine:

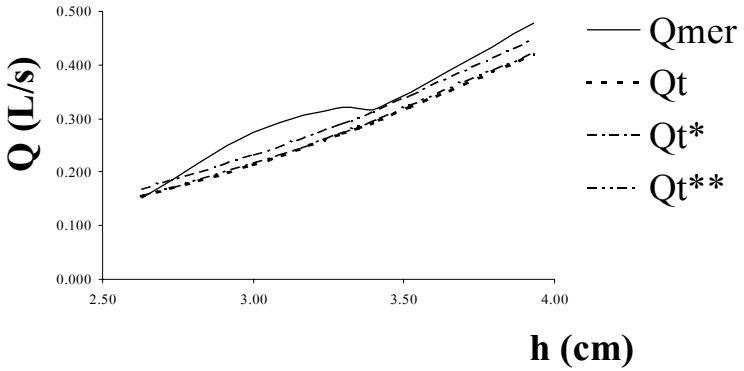
$$\delta Q_T = \frac{\partial Q_T}{\partial h}\delta h$$

•Neodređenost za mereni protok ako uzmemo u obzir neodređenost svih parametara:

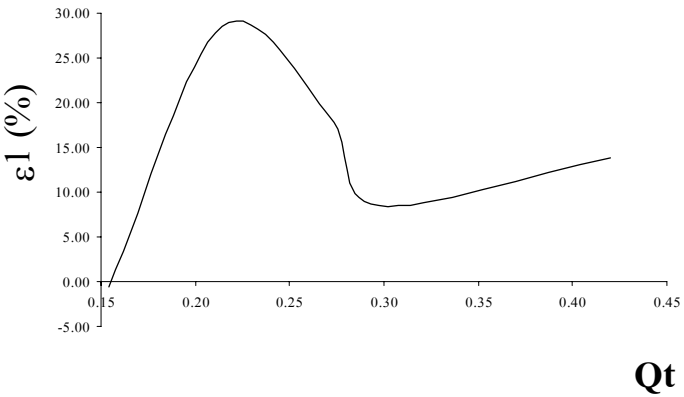
$$\delta Q_{MER} = \sqrt{\left(\frac{\partial Q_{MER}}{\partial M}\right)^2 \delta_M{}^2 + \left(\frac{\partial Q_{MER}}{\partial t}\right)^2 \delta_t{}^2 + \left(\frac{\partial Q_{MER}}{\partial \rho}\right)^2 \delta_\rho{}^2}$$

Izgled dijagrama

Prikaz različitih formula za Thompson-ov preliv



Greške merenja



Apsolutna neodređenost za Qmer