

Građevinski fakultet
Univerziteta u Beogradu
Odsek za hidrotehniku i vodno-ekološko inženjerstvo

Vežba 8: PROJEKTOVANJE MERNOG SUŽENJA

Studenti:

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Predmet:

Merenja u hidrotehnici

Merno suženje:

- ▶ Hidrotehnički objekt
- ▶ Način merenja protoka
- ▶ Formiranje kritične dubine
- ▶ Iterativno projektovanje (WinFlume)

<p>U.S. Bureau of Reclamation Hydraulics Laboratory</p>  <p>www.usbr.gov/pmts/hydraulics_lab</p>	<p>USDA - Agricultural Research Service Arid-Land Agricultural Research Center</p>  <p>www.ars.usda.gov</p>	<p>International Institute for Land Reclamation & Improvement</p>  <p>www.iri.nl</p>
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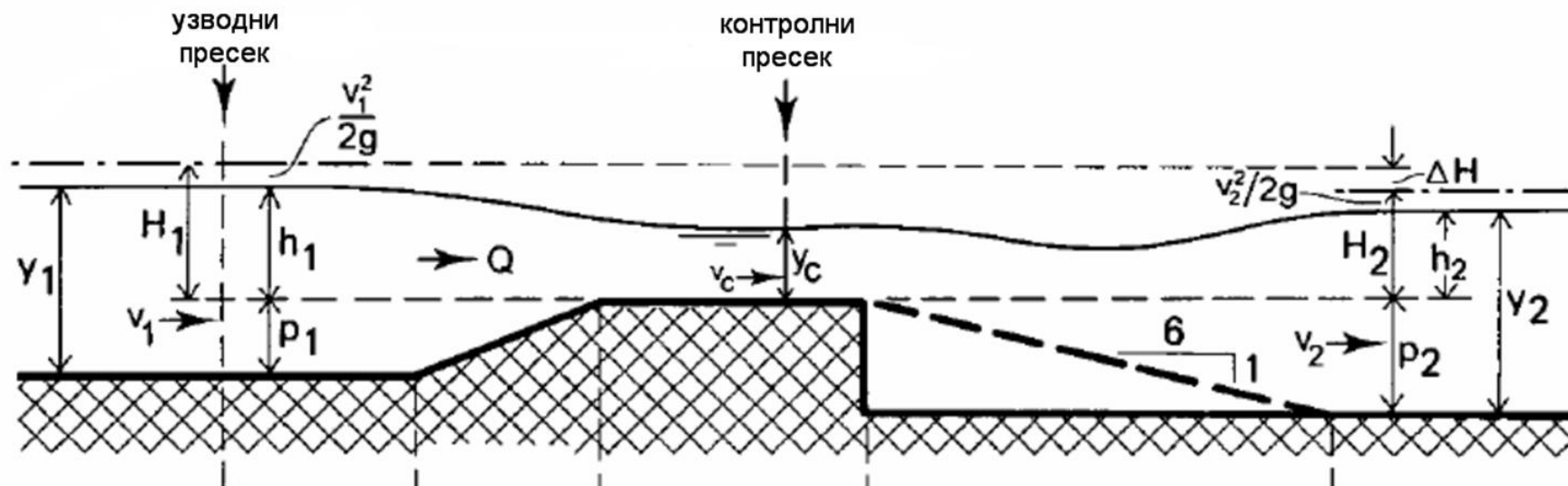
<p><i>WinFlume</i></p> <p>WinFlume32 - Version 1.06.0006</p> <p>www.usbr.gov/pmts/hydraulics_lab/winflume</p> <p>Details OK</p>	<p>Software for the design and calibration of long-throated flumes and broad-crested weirs</p>  <p>Tony L. Wahl, USBR, Denver, Colorado Albert J. Clemmens, ARS, Phoenix, Arizona Marinus G. Bos, ILRI, Wageningen, The Netherlands John A. Replogle, ARS, Phoenix, Arizona</p>
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Hidraulički proračun:

- ▶ Merno suženje → kritična dubina → $Fr=1$
- ▶ Bernulijeva jednačina → Protok

$$h_1 + \frac{Q^2}{2gA_1^2} = h_K + \frac{Q^2}{2gA_K^2} (1 + \xi)$$

- ▶ Q-H kriva



Softversko rešenje

▶ Ulazni podaci:

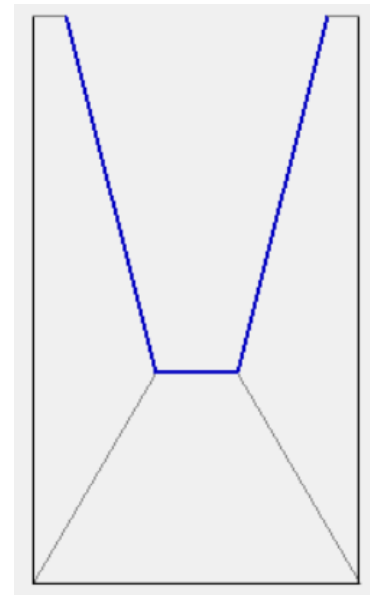
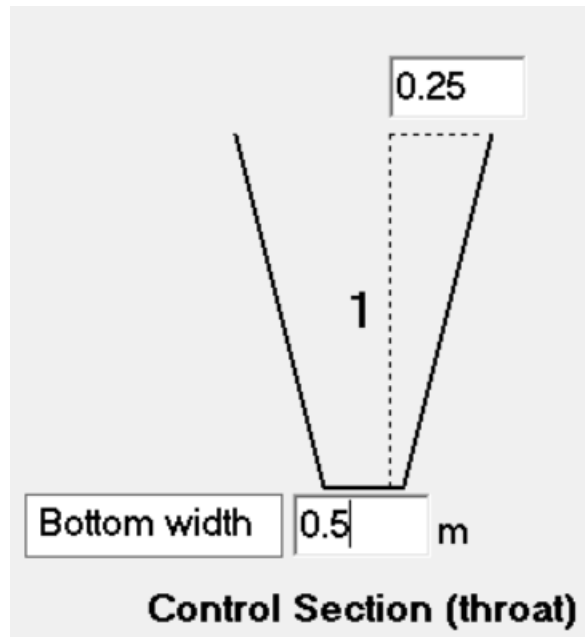
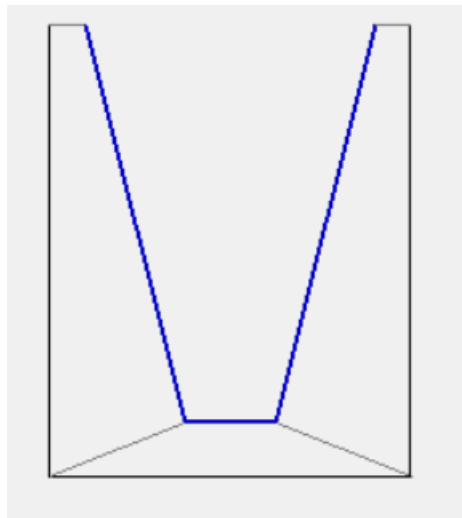
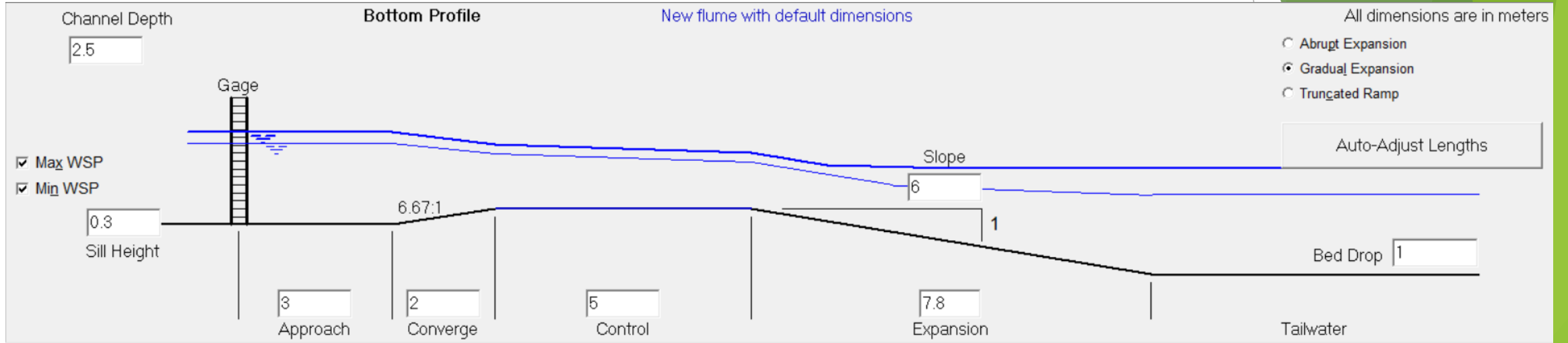
- Q_{\max}
- Q_{\min}
- l_d
- n

▶ Metod proračuna → Šezi-Maningova jednačina

▶ Način merenja → Vodomerna letva u bunaru

▶ Rezultat → Q-H kriva

Situacija i karakteristični preseci mernog suženja



Rezultati projektovanja suženja

Design is acceptable.

$Q_{max} = 3.400$ cu. m/s

$Q_{min} = 2.400$ cu. m/s

EVALUATION OF DESIGN CRITERIA

Ok. Froude number @ $Q_{max} = 0.177$

Ok. Freeboard @ $Q_{max} = 0.388$ m

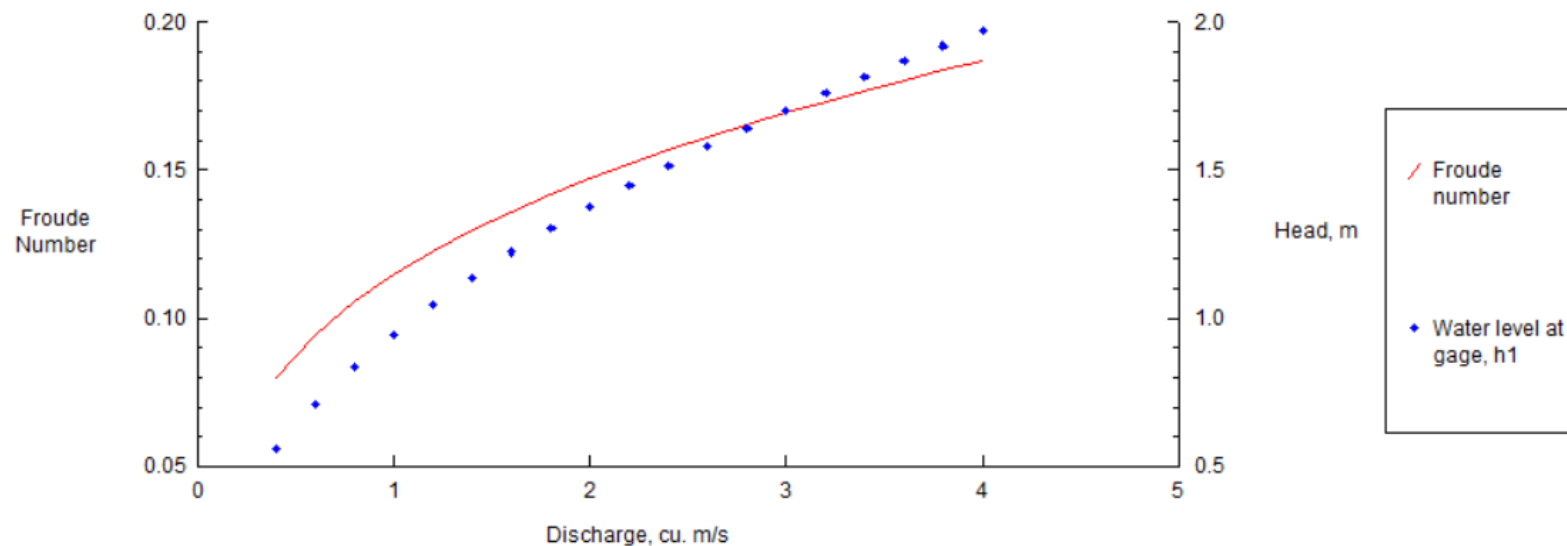
Ok. Submergence Protection @ $Q_{max} = 2.039$ m

Ok. Submergence Protection @ $Q_{min} = 1.948$ m

Ok. Expected uncertainty @ $Q_{max} = \pm 2.04$ %

Ok. Expected uncertainty @ $Q_{min} = \pm 2.08$ %

New flume with default dimensions - Revision 5



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