Contoh Soal 1

Diketahui :

$H = 2$ m, $V = 1,5$ m/det , $b = 4$ m

Hitung tinggi muka air bila ada tonjolan($\Delta Z=0,328$m)

Jawab :

$Fr = U1 / (gh)^{0,5} = 0,339$

$\Delta Zc = h1(1+ Fr_1^2/2 - 1,5 Fr_1^{2/3}) = 0,656$

$\Delta Z < \Delta Zc$, blm menyebabkan aliran kritis

$E1 = h1 + V_1^2/ 2g = 2 + 1,5^2/ (2.9,81) = 2,115$

$E2 = E1 - \Delta Z = 2,115 - 0,328 = 1,787$ m

$E2 = h_2 + Q^2 /(b_2^2 h_2^2 2. 9,81)$

Dgn coba-coba didapat $h_2 = 1,62$m

Contoh Soal 2

Diketahui :

H = 2 m, V = 1,5 m/det , b = 4 m

Hitung tinggi muka air bila ada tonjolan(Δ Z=0,8m)

Jawab :

Fr = U1 / $(gh)^{0,5}$ =0,339

Δ Zc = h1(1+ Fr_1^2/2 – 1,5 $Fr_1^{2/3}$) = 0,656

Δ Z > Δ Zc , sdh menyebabkan aliran kritis

E1 = h1 + V_1^2/ 2g = 2 + $1,5^2$/ (2.9,81) = 2,115

Hc = $(Q^2/(b^2.9,81)^{1/3}$ = 0,971 m

Ec = 1,5 hc = 1,5 . 0,971 = 1,4565 m

Ec + Δ Z = 1,4565 + 0,8 = 2,2565 m

Ec + Δ Z > E1 , mustahil , maka muka air 1 akan naik dgn energi E1 = E2

Degn coba-coba didapat h1 = 2,23351 m

Contoh Soal 3

Diketahui :

h1 = 2 m, V1 = 1,5 m/det , b1 = 4 m

Hitung tinggi muka air bila ada tonjolan

(Δ Z=0,1m) dan dipersempit dgn lebar (b2 =3m)

Jawab :

Fr = U1 / (gh)^{0,5} =0,339

Q = b1.h1.V1= 4.2.1,5 = 12 m^3/s

E1 = h1 + V_1^2/ 2g = 2 + 1,5 ^{2}/ (2.9,81) = 2,115 m

$$\text{hc} = \sqrt[3]{\left(\frac{Q}{b2}\right)^2 \frac{1}{g}} = \sqrt[3]{\left(\frac{12}{3}\right)^2 \frac{1}{9{,}81}} = 1{,}18 \; m$$

Ec = 3 /2 . 1,18 =1,77 m

Ec + Δ Z= 1,77 + 0,1 = 1,87 m < E1(2,115m)

Karena Ec + Δ Z < E1 maka muka air di titik 1 tetap

E2 = E1 - Δ Z = 2,115 – 0,1 = 2,015 m

E2 = h_2 + Q^2 /($b_2{}^2 h_2{}^2$ 2. 9,81)

Dgn coba-coba didapat h_2 = 1,84m

Contoh Soal 4

Diketahui :

h1 = 2 m, V1 = 1,5 m/det , b1 = 4 m

Hitung tinggi muka air bila ada tonjolan

(Δ Z=0,4m) dan dipersempit dgn lebar (b2 =2m)

Jawab :

Fr = U1 / (gh)^{0,5} =0,339

Q = b1.h1.V1= 4.2.1,5 = 12 m^3/s

E1 = h1 + V_1^2/ 2g = 2 + 1,5 ^{2}/ (2.9,81) = 2,115 m

$$\mathrm{hc} = \sqrt[3]{\left(\frac{Q}{b2}\right)^2 \frac{1}{g}} = \sqrt[3]{\left(\frac{12}{2}\right)^2 \frac{1}{9,81}} = 1,57 \; m$$

Ec = 3 /2 . 1,57 =2,35 m

Ec + Δ Z= 2,35 + 0,4 = 2,75 m > E1(2,115m)

Karena Ec + Δ Z > E1 maka muka air di titik 1

Berubah(terbendung)

E1 = Ec + Δ Z = 2,75 m

E1 = h1 + V_1^2/ 2g = h1+ 1,5 ^{2}/ (2.9,81) =2,75

Dengan coba-coba didapat h1 = 2,6475 m

Contoh Soal 2

Diketahui :

$H = 2$ m, $V = 1,5$ m/det , $b = 4$ m

Hitung tinggi muka air bila ada tonjolan($\Delta Z = 0,8$m)

Jawab :

$Fr = U1 / (gh)^{0,5} = 0,339$

$\Delta Zc = h1(1+ Fr_1^2/2 - 1,5 Fr_1^{2/3}) = 0,656$

$\Delta Z > \Delta Zc$, sdh menyebabkan aliran kritis

$E1 = h1 + V_1^2/2g = 2 + 1,5^2/(2.9,81) = 2,115$

$Hc = (Q^2/(b^2.9,81)^{1/3} = 0,971$ m

$Ec = 1,5$ hc $= 1,5 . 0,971 = 1,4565$ m

$Ec + \Delta Z = 1,4565 + 0,8 = 2,2565$ m

$Ec + \Delta Z > E1$, mustahil , maka muka air 1 akan naik dgn energi $E1 = E2$

Degn coba-coba didapat h1 = 2,23351 m