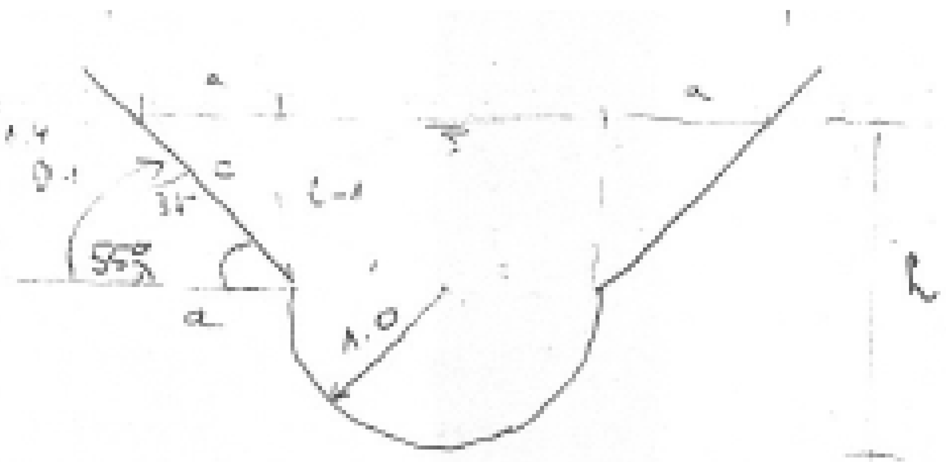

a)

$k = 0.014\ m^{1/3}.s$ $\qquad$ $\frac{h-1}{a} = tg\,55°$

$h_k = 2.4\ m$ $\qquad$ $a = \frac{1,4}{tg\,55°} \doteq 0.98$

$$Fr = 1 \quad = \frac{Q^2 \cdot 3,96}{9,81 \cdot A^3} = \frac{Q^2 \cdot 3,96}{9,81 \cdot 189,12} = Q^2 \cdot 2,132 \cdot 10^{-3} = 1$$

$$A = \frac{3,96 + 2}{2} \cdot 1,4 + \frac{1^2 \pi}{2} = 4,172 + 1,57 = 5,742$$

$$\Rightarrow Q^2 = \frac{1}{2,132 \cdot 10^{-3}} = 469,04$$

$$Q = 21,657\ m^3/s = 21\,657\ l/s$$

б) $I_0 = 0,5‰ = 0,0005$

$Q = 21\,657\ \frac{l}{s} = 21,657\ \frac{m^3}{s}$

$Q = \frac{1}{n} \cdot A \cdot R^{2/3} \sqrt{I_0}$

$tg 55^\circ = \frac{h-1}{a}$

$A = \frac{2+2+2\cdot\frac{h-1}{1,43}}{2} \cdot (h-1) + \frac{r^2\pi}{2}$ $\qquad a = \frac{h-1}{tg 55^\circ} = \frac{h-1}{1,43}$

$A = \frac{2\left(2+\frac{h-1}{1,43}\right)}{2} \cdot (h-1) + \frac{\pi}{2}$ $\qquad c = \frac{h-1}{\sin 55^\circ} = \frac{h-1}{0,82}$

$A = (2 + 0,7(h-1)) \cdot (h-1) + 1,57$

$A = (2 + 0,7h - 0,7) \cdot (h-1) + 1,57$

$A = (1,3 + 0,7h)(h-1) + 1,57$

$O = \frac{2r\pi}{2} + 2c = \pi + 2 \cdot \frac{h-1}{0,82} = 3,14 + 2,44\,(h-1) =$

$= 3,14 + 2,44h - 2,44 = \underline{0,7 + 2,44 \cdot h}$

$R = \frac{A}{O} = \frac{(1,3+0,7h)(h-1)+1,57}{0,7+2,44\cdot h}$

$Q = \frac{1}{n} \cdot ((1,3+0,7h)(h-1)+1,57) \cdot \sqrt[3]{\left(\frac{(1,3+0,7h)(h-1)+1,57}{0,7+2,44h}\right)^2} \cdot \sqrt{I_0}$

$((1,3+0,7h)(h-1)+1,57) \cdot \sqrt[3]{\left(\frac{(1,3+0,7h)(h-1)+1,57}{0,7+2,44h}\right)^2} = 13,56$

$((1,3+0,7h)(h-1)+1,57)^3 \cdot \left(\frac{(1,3+0,7h)(h-1)+1,57}{0,7+2,44h}\right)^2 = 2493,33$

$h_N \approx 3,66$

в) $h_N > h_k \Rightarrow$ мирен режим

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