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Donald Jeraleman Assignment Lecture 20 Hydraulics F2010

$y_2 = 5.5'$ $y_1 = 6'$ $x_1 = 0$ $Q = 1000\ cfs$ $n = 0.02$ $S_o = 0.001$ $B = 40' = b$

y	dy	A	P	$AR^{2/3}$	$A\sqrt{D}$	f	$\bar{f}$	$\Delta x = \Delta y \bar{f}$	X
6	0	240	52	665.3	587.9	2224	2087	0	0
5.5	0.5	220	51	582.99	515.95	1891	2087	1028.8	1028.8

Signs

$q = \frac{Q}{b} = \frac{1000}{40} = 25\ cfs/ft$; $C_Q = \frac{nQ}{c' S_o^{1/2}} = \frac{0.02(1000)}{1.486(0.001)^{1/2}} = 425.61$

$f_b = \left(1 - \left(\frac{1000}{587.9\sqrt{32.2}}\right)^2\right) / 0.001\left(1 - \left(\frac{425.6}{665.3}\right)^2\right) = 2224$

$f_{5.5} = \left(1 - \left(\frac{1000}{516\sqrt{32.2}}\right)^2\right) / 0.001\left(1 - \left(\frac{425.6}{525}\right)^2\right) = 1891$

$\bar{f} = 2057.6$

$y_n \Rightarrow Q = \frac{c'}{n}(b y_n)\left(\frac{b y_n}{b + 2y_n}\right)^{2/3} S_o^{1/2} = \frac{1.486}{0.02}(40 y_n)\left(\frac{40 y_n}{40 + 2y_n}\right)^{2/3} S_o^{1/2}$

$\rightarrow y_n = \boxed{4.48\ ft}$

$y_c \Rightarrow Q_c = Q = \sqrt{y'}\sqrt{D_c}\,A_c = \sqrt{y}\,\sqrt{y_c}\,(y_c)(b)$

$1000\ cfs = \sqrt{32.2}\ y_c^{3/2}\ (40')$

$\rightarrow y_c = \boxed{2.69\ ft}$

- y_2
- y_1
- y_n
- y_c

M1 Curve