

Nonuniform velocity distributions

Engineering Fluid Mechanics

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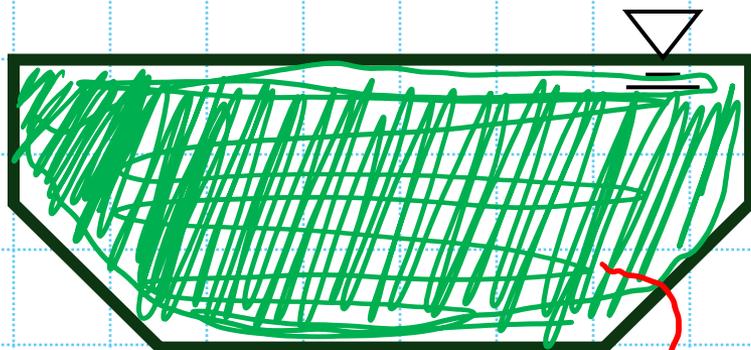
Velocity:

Low (slow)

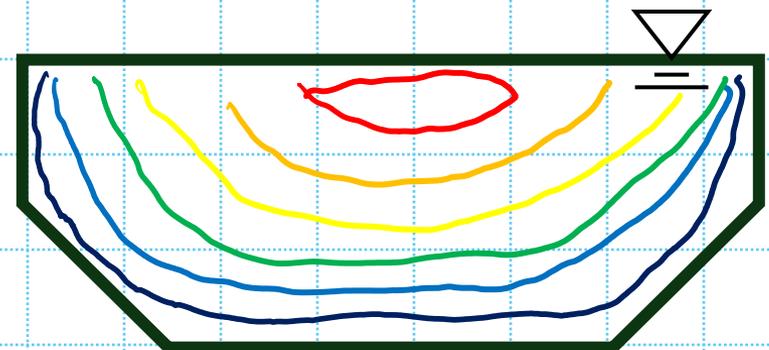
High (fast)



Uniform
velocity distribution



Nonuniform
velocity distribution



$$v_{avg} = \frac{Q}{A} = \text{[scribble]}$$

$$v_{avg} = \frac{Q}{A} = ?$$

$v_{avg} < v_{actual}$

Nonuniform velocity distributions

Velocity:

Low (slow)

High (fast)

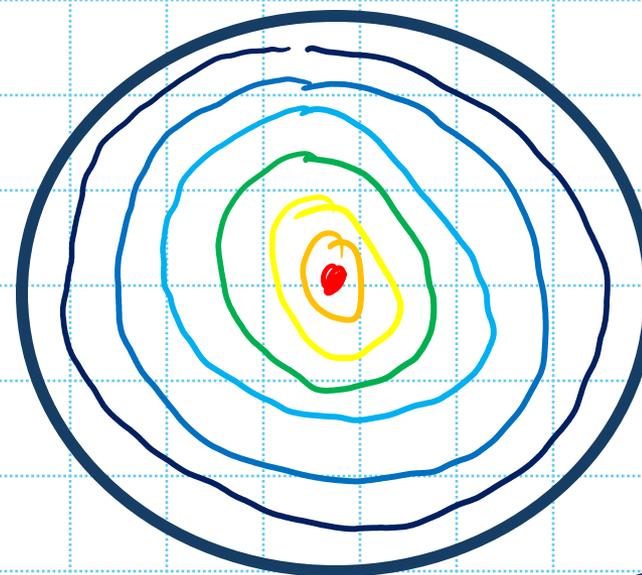


Uniform
velocity distribution



$$v_{avg} = \frac{Q}{A} = v_{actual}$$

Nonuniform
velocity distribution



$$v_{avg} = \frac{Q}{A} < v_{actual}$$

Nonuniform velocity distributions v_{actual}

$$H = \frac{P}{\rho g} + \alpha \frac{V_{avg}^2}{2g} + Z$$

KINETIC
CORRECTION
FACTOR

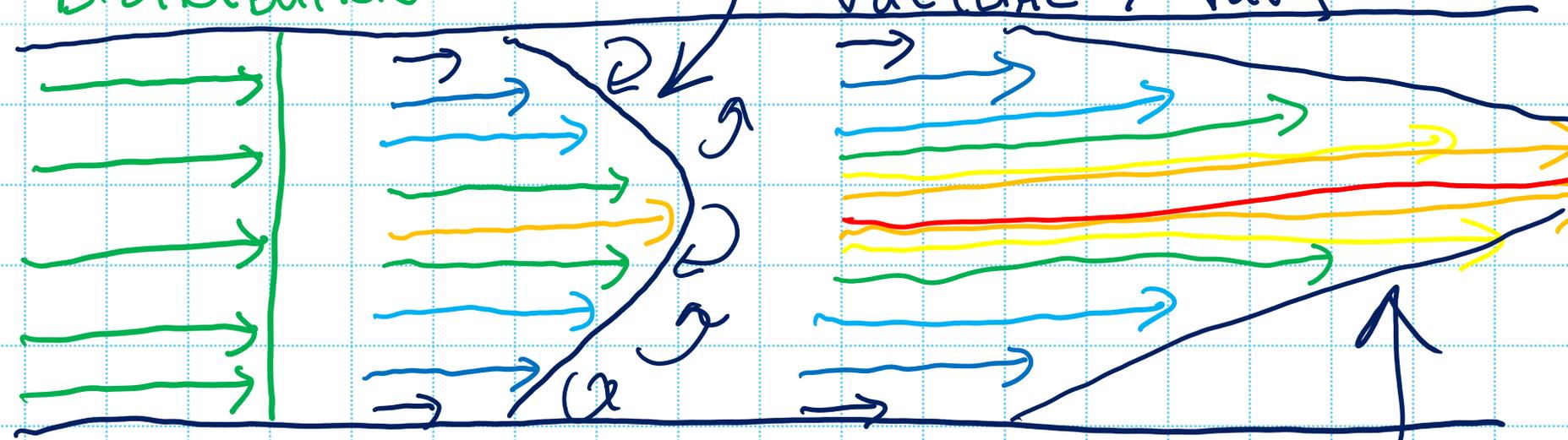
α : VARIES FROM 1 - 2
ALWAYS > 1

Velocity head correction



$V_{ACTUAL} = V_{avg}$
UNIFORM
DISTRIBUTION

FULLY-DEVELOPED
NON UNIFORM DISTRIBUTION
 $V_{ACTUAL} > V_{avg}$
 $\alpha \approx 1.05$



$\alpha = 1$

Turbulent
flow

FULLY DEVELOPED
HIGHLY NONUNIFORM
 $V_{ACTUAL} \gg V_{avg}$
 $\alpha \approx 2$
LAMINAR FLOW

Alpha and flow development



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THE END



Video credit: Kelly Kibler, Ricon, Puerto Rico