

CHEN.3170 Applied Engineering Problem Solving

A Short Quiz on

1-D Function Evaluation and Plotting in Matlab

The pressure drop Δp in Pa for a fluid flowing in a pipe with a sudden increase in diameter is given by

$$\Delta p = \frac{1}{2} \left\{ 1 - \left(\frac{d}{D} \right)^2 \right\}^2 \rho v^2 \quad (1)$$

where d and D are the small and large pipe diameters, respectively, ρ is the fluid density, and v is the average fluid velocity in the small pipe. The goal here is to write a complete Matlab script file to plot Δp (in Pa) as a function of D , where D varies over the range $2 \text{ in} \leq D \leq 12 \text{ in}$ with $d = 2 \text{ in}$, $\rho = 850 \text{ kg/m}^3$, $v = 5 \text{ m/s}$.

Actually, we would like to do this two ways, using **scalar arithmetic** and using **Matlab's vector processing capability**, as follows:

Code Sequence #1: Write a complete script file using only *scalar arithmetic* to evaluate eqn. (1) and to generate a well-annotated plot as indicated above.

Code Sequence #2: Rewrite the computational section to use **Matlab's vector processing capability**. Do not repeat the parameter definition and plotting segments of your script file since these will be the same as above (i.e. only rewrite the code segment that does the evaluation of eqn. (1)).