

Case Study-1

- Determination of friction factor from implicit equation
- Solve a nonlinear algebraic equation relating friction factor and flow parameters.

→ used Darcy-Weisbach eqⁿ
$$h_f = f \frac{L}{D} \frac{V^2}{2g}$$

→ Colebrook Equation
$$\frac{1}{\sqrt{f}} = -2 \log_{10} \left(\frac{\frac{\epsilon}{3.7D}}{\uparrow \text{Diameter}} + \frac{2.51}{Re \sqrt{f}} \right)$$

→

Code:

```
clc; clear; close all;

% Given values
Re = 1e5;
D = 0.05;
eps = 0.00015; % Roughness(m)

% Colebrook equation
func = @(f) (1/sqrt(f)) + ...
    2*log10((eps/(3.7*D)) + (2.51/(Re*sqrt(f))));

% Initial guess
f_initial = 0.03;

f = fzero(func, f_initial);

disp('Friction factor = ')
disp(f)
```

Output:

```
Friction factor =
    0.0275
```