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17/ENG06/1095

Mechanical Engineering

Assignment 1

$$f_D = \frac{0.3V^2}{500+(10V)^3} - 0.02V \quad \text{---(1)}$$

$$f_{D1} = mg = 3.5 \times 9.8 = 34.3 \quad \text{---(2)}$$

equating eqn 1 and 2

$$mg = 34.3 = \frac{0.3V^2}{500+(10V)^3} - 0.02V$$

Making V^2 subject of formula

$$34.3 + 0.02V = \frac{0.3V^2}{500+(10V)^3}$$

$$0.3V^2 = (34.3+0.02V) * (500+(10V)^3)$$

$$V^2 = (34.3+0.02V) * (300+(10V)^3)/0.3$$

$$V = \sqrt{(34.3+0.02V) * (500+(10V)^3)/0.3}$$

Initial guess value $= V_0 = 0.5 m/s$

Absolute % relative error $E_a(T+1) \times |\varepsilon - 1|$

Matlab Codes

Command Window

```
Clear
cls
Close all
Syms v
 V = 0.5
 T = 1 ; Inf
 Iter(T+1)=T;
  V(T+1) = (((34.3+(0.002*(v^3)))*(500+(log(v^3)))))/0.3)^0.5;
  Ea(T+1) = abs((V(T+1)-V(i))/V(T+1)) * 100;
```

```
if Ea(i+1) <= 1E-11
break
end
table = ['iter' v' Ea']
```

the estimated terminal velocity is 304.07m/s substituting in eqn (1) for 3