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17/EM606/048
Mechanical Engineering
EM6382 Assignment

Command Window

Clear

clc

Format short

$$V = 0.5$$

$$M = 3.5$$

$$g = 9.8$$

$$F = M * g$$

$$V = \text{sqrt}(((F + (0.02 * V)) * ((\log(V)^3)) + (10 * V) + 17150) / 0.3);$$

For i = 1: int

iter (i+1) = i

$$V(i+1) = \text{sqrt}(((F + (0.02 * V(i))) * (\log(V(i))^3) + (10 * V(i)) + 17150) / 0.3)$$

$$\epsilon_a(i+1) = \text{abs}(((V(i+1) - V(i)) / V(i+1)) * 100)$$

if $\epsilon_a(i+1) \leq 1E-11$

break

end

end

table = table(iter, 'V', 'εa')

Output

Iter	V	ϵ_q
0	0.5	0
1	239.05	99.791
2	294.17	18.736
3	302.61	2.7894
4	303.85	0.40992
5	304.04	0.060144
6	304.06	0.0088222
7	304.07	0.0012941
8	304.07	0.00018981
9	304.07	$2.7842e^{-05}$
10	304.07	$4.0838e^{-06}$
11	304.07	$8.7865e^{-08}$
12	304.07	$1.2888e^{-08}$
13	304.07	$1.8904e^{-09}$
14	304.07	$2.7727e^{-60}$
15	304.07	$4.0679e^{-11}$
16	304.07	$5.9635e^{-12}$

Converging at Iter = 7; $V = 304.07$
 Prove

$$F_D = \frac{0.3V^2}{500 + (\ln V)^3} - 0.02V$$

If $V = 304.07$

Recall $F_D = 9.8 \times 3.5 = 34.30$

Substituting $V = 304.07$

$$F_D = \frac{0.3 \times (304.07)^2}{500 + (\ln(304.07))^3} - 0.02(304.07)$$

$$F_D = 40.38195931 - 6.60814$$

$$F_D = \underline{\underline{34.3}}$$