

VLADIP0 Tomi ISAAC

17/ENG05/030

MECHATRONICS ENGINEERING

ENG 382

Assignment I

Solution

Command window

clear

clc

format short

$$V = 0.5$$

$$m = 3.5$$

$$g = 9.8$$

$$F = m * g$$

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

for i = 1: Inf

$$\text{iter}(i+1) = i$$

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

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

$$\text{if } E_a(i+1) < 1e-11$$

break

end

end

table = table(iter, 'V', 'Ea')

OUTPUT

iter	V	Ea
0	0.5	0
1	239.05	97.791
2	294.17	18.736
3	302.61	2.7894
4	303.35	0.40992

5	304.04	0.060144
6	304.06	0.0088222
7	304.07	0.00018981 0.012941
8	304.07	+ 7842e-05 0.00018981
9	304.07	4.0833e-06 1.7842e-05
10	304.07	8.7865e-08 4.0833e-06
11	304.07	8.7865e-08
12	304.07	1.2888e-08
13	304.07	1.8904e-08
14	304.07	2.727e-10
15	304.07	4.0679e-11
16	304.07	5.9635e-12

Converging at iter = 7, $V = 304.07$

Prove

$$F_A = \frac{0.3V^2}{500 + (inv)^3}$$

$$\text{If } V = 304.07$$

$$\text{Recall } E_A = 9.8 \times 3.5 = 34.30$$

$$\text{Substituting } V = 304.07$$

$$F_A = \frac{0.3 \times (304.07)^2}{500 + (inv(304.07))^3} = 0.02(304.07)$$

$$F_A = 40.38195931 - 600814$$

$$F_A = 34.3$$