

OLUKOYO OMOSTALEWA DANIEL

17/EAB05/033

MECHATRONICS

800 LEVEL

ENG 382

Solution

Command window

clear

clc

format short

v = 0.5

m = 3.5

q = 9.8

f = m * q

v = Sqrt(C*(C*(f + (0.02 * v)) * ((log(v)^3)) + (10 * v) + 17150) / 0.3);

for i = 1 : mf

iter(i) = i

v(i+1) = Sqrt(C*(C*(f + (0.02 * v(i))) * ((log(v(i)))^3) + 10 * v(i) + 17150) / 0.3);

ea(i+1) = abs((v(i+1) - v(i)) / v(i+1)) * 100;

If ea(i+1) <= 1 * 10^-11

break

end

end

table = table(Iter, v, ea)

Output

| Iter | v | ea |
|------|--------|------------|
| 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 | 4.0858e-06 |
| 11 | 304.07 | 8.7865e-08 |

| | | |
|----|--------|-----------------|
| 12 | 304.07 | $1.2888e^{-08}$ |
| 13 | 304.07 | $1.8904e^{-09}$ |
| 14 | 304.07 | $8.7727e^{-10}$ |
| 15 | 304.07 | $4.0679e^{-11}$ |
| 16 | 304.07 | $5.9633e^{-12}$ |

Converging of iter = 7, $V = 304.07$
 Proven ✓

$$f_D = 0.3v^2 - 0.02V$$

$$500 + (mv)^3$$

$$1fv = 304.07$$

$$\text{Recall } f_D = 9.8 \times 8.5 = 34.30$$

Substituting $V = 304.07$

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

$$f_D = 40.38195931 - 6.0814$$

$$f_D = 34.37$$