

Command Window

clear

clc

Format short

$V = 0.5$

$m = 3.5$

$q = 9.8$

$F = m * q$

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

for $i = 1 : \text{int}$

iter($i+1$) = i

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

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

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

break

end

end

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

Output

Iter	V	E _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

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

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

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

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

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

$$F_D = 40.38195931 - 6.60814$$

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