

command window

clear

clc

format short

V=0.5

m=3.5

a=9.8

f=m*a

V = sqrt(((f + (0.02 * V)) * ((log(V)^3)) + (10 * V) + 17150) / 0.3);

for i = 1:inf

iter(i+1) = i

V(i+1) = sqrt(((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) <= 1E-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	2.7842×10^{-05}
10	304.07	4.0838×10^{-06}
11	304.07	8.7865×10^{-08}
12	304.07	1.2888×10^{-08}
13	304.07	1.8904×10^{-09}
14	304.07	2.7727×10^{-10}
15	304.07	4.1671×10^{-11}
16	304.07	5.9635×10^{-12}

Converging at iter = 7, V = 304.07

Probe

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

$$V = 304.07$$

$$\text{Recall } F_D = 9.8 \times 5.5 = 3430$$

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

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

$$F_D = 40.38195931 = 660314$$

$$F_D = 34.3$$