

James Evidence  
 19/06/049  
 Mechanical Engineering  
 Eng 382 Assignment 1  
 Solution

Command window

clear

clc

format short

V = 0.5

m = 3.5

g = 9.81

f = m \* g

v = sqrt(((f + (0.02 \* v)) \* (log(v)^3)) + (10 \* v) + (19150) / 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)) + (19150) / 0.3)

Ea(i+1) = abs((v(i+1) - v(i)) / v(i)) \* 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	0.0018981

9	304.07	$2.9842e^{-05}$
10	304.07	$4.0838e^{-06}$
11	304.07	$8.0838e^{-08}$
12	304.07	$1.2888e^{-08}$
13	304.07	$1.8904e^{-09}$
14	304.07	$2.9927e^{-10}$
15	304.07	$4.0679e^{-11}$
16	304.07	$5.9635e^{-12}$

Converging at iter=7  $V=304.07$   
 Prove

$$F_0 = \frac{0.3V^2}{5004 (in)^3} = 0.02V$$

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

$$\text{Redball } f_D = 9.8 \times 3.5 = 34.30$$

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

$$F_D = \frac{0.3 \times (304.07)^2}{5004 + (10(304.07)^3)} = 0.02(304.07)$$

$$F_D = 40.38195931 - 660814$$

$$F_D = 34.3$$