OSIAGBE ANTHONY OSAGIE

17/ENG03/053

CIVIL ENGINEERING

Solution

Command window

```
clear
clc
format short
v = 0.5
m = 3.5
g = 9.8
f = m*g
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);
fa(i+1) = abs(((v(i+1)-v(i))/v(i+1))*100)
  if ea(i+1) <= 1.e-11
break
end
end
table = table(iter,v',fa')
```

Output

iter	v	Ea
0	0.5	0
1	239.03	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	0.0088228
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	1.2388e-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 at iter = 7, v = 304.07

Proven

$f_D = \frac{0.3v^2}{500+(inv)^3} - 0.02v$

If v = 304.07

Recall $f_D = 9.8 \times 3.5 = 34.30$

Substituting v = 304.07

$FD = \frac{0.3\times(304.07)^2}{500+(in(30407)^3} - 0.02(304.07)$

$FD = 40.38195931 - 6.00814$

$fD = 34.37$