Aremu Fawaz Babajide
17/ENG06/007
Mechatronics Engineering.

Answer

Command window

```
Clear
Clc
format short.
vi = 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))
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	0.40792.
5	304.04	0.060144
6	304.06	0.0088222

7	304.07	0.00129411
8	304.07	0.00018981
9	304.07	2.7812e-05
10	304.07	4.0888e-06
11	304.07	5.7865e-08
12	304.07	1.2888e-08
13	304.07	1.8904e-09
14	304.07	2.727e-10
15	304.07	4.0679e-11
16	304.07	5.9635e-12

Converging at iter = 9 , V = 304.07

Now

$$f_D = \frac{0.3V^2}{500 + (\text{imV})^2} = 0.02V$$

at V = 304.07

Recall $f_D = 9.8 \times 3.5 = 34.30$

Substituting V = 304.07

$$f_D = \frac{0.3\ (304.07)^2}{500 + (\text{im } 304.07)^2} = 0.02\ (304.07)$$

$$f_D = 40.381959 31 - 6.0081i$$

$$f_D = 34.3$$