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17/ENG03/025

Civil Engineering
ENG 382 - Engineering Mathematics

Assignment 1

Using Matlab:

Command window

```
clear
clc
Format short
V=0.5
m=3.5
g=9.8
F=m*g
V=sqrt(((((CF+(0.002*V))*((Log(V)^3))
+(10*V)+17150)/0.3);
for i=1:inf
Iter(i+1)=i
V(i+1)=sqrt(((((CF+(0.002*V(1)))*(log(V(1)))^3)
+(10*V(1))+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	234.05	99.791
2	294.17	18.736
3	302.61	2.7894
4	303.85	0.40992
5	304.04	0.060144

Iter	V	Ea
6	304.06	0.0088222
7	304.07	0.0012941
8	304.07	0.0001898 1
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-10
15	304.07	4.0679e-11
16	304.07	5.9635e-12

Converging at iter=7; $v = 304.07$

Proven

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

If $v = 304.07$

Recall $f_D = 9.8 \times 3.5 = 34.30$

Substituting $v = 304.07$

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

$F_D = 40.381495931 - 6.60814$

$F_D = 34.3$ //