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17/EX403/039

CIVIL ENGINEERING

##

Command window

clear

clc

format short

V = 0.5

m = 3.5

g = 9.8

F = m \* g

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

for i = 1 : mf

iter(i+1) = i

V(i+1) = sqrt((C \* (F + (0.02 \* V(i)))) \* (log(V(i)))^3) + (10 \* V(i)) + 17150 / 0.3);

Ea(i+1) = abs(C \* (V(i+1)) - V(i)) / V(i+1) \* 100

if Ea(i+1) <= 1E-11

break

end

end

tablo = 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	2.7094
4	303.85	0.40192
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 e-05
10	304.07	4.0838 e-06
11	304.07	8.7865 e-08
12	304.07	1.2888 e-08
13	304.07	1.8904 e-09
14	304.07	2.7727 e-10
15	304.07	4.0679 e-11
16	304.07	5.9635 e-12

Converging at iter = 7

$$V = 304.07$$

Prove

$$f_0 = \frac{0.3V^2}{500 + (hV)^3} - 0.02V$$

If  $V = 304.07$

Recall  $f_0 = 9.8 \times 3.5 = 34.30$

Substituting  $V = 304.07$

$$f_0 = \frac{0.3 \times (304.07)^2}{500 + (h(304.07))^3} - 0.02(304.07)$$

$$f_0 = 40.381959 - 6.0814$$

$$f_0 = 34.3$$