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Chemical Engineering

ASSIGNMENT 1

Command window

clear

clc

format short

V=0.5

m=35

g=9.8

P=mg

V = sqrt(CCC(F + (0.02 \* V)) \* (C log(V \* 3)) + (C \* V) + (150 / 0.3));

for c = 1:inf

    V(c+1) = V

    V(c+1) = sqrt(CCC(F + (0.02 \* V(c))) \* (C log(V(c) \* 3)) + (C \* V(c)) + (150 / 0.3));

    Ea(c+1) = abs(CCC \* V(c+1) - V(c)) / (V(c+1) \* 100);

    if Ea(c+1) <= 1e-11

        break

    end

end

table = table('c', 'V', 'Ea')

Output

$i$	$v_i$	$\epsilon_i$
0	0.5	0
1	239.05	99.791
2	294.17	18.736
3	302.61	2.7899
4	303.85	0.40992
5	304.07	0.066144
6	304.06	0.0088222
7	304.07	0.0012941
8	304.07	0.00015981
9	304.07	2.7542 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	1.8909 e-09
14	304.07	2.7727 e-10
15	304.07	4.0679 e-11
16	304.07	5.9635 e-12

Convergence of  $v_i = 7$ ,  $v = 304.07$

Prove

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

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

$$\text{Recall } F_D = 9.8 \times 3.5 = 34.3$$

Substituting  $v = 304.07$

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

$$F_D = 20.38195931 = 6.0814$$

$$F_D = 34.3$$