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Elect/Elect Engr.

ASSIGNMENT 1

$$F_b = m \times g$$

$$m = 3.5; g = 9.8$$

$$F_b = 3.5 \times 9.8 \\ = 34.3$$

Hence

$$34.3 = \frac{0.3V^2}{500 + (\ln V)^3} - 0.02V$$

$$34.3 = \frac{0.3V^2}{500 + (\ln V)^3} - \frac{0.02}{1}$$

$$34.3 = \frac{0.3V^2 - (500 + (\ln V)^3)(0.02V)}{(500 + (\ln V)^3)}$$

$$17150 + (34.3 (\ln V)^3) = 0.3V^2 - (10V + 0.02V (\ln V)^3)$$

$$17150 + 34.3 (\ln V)^3 = 0.3V^2 - 10V - 0.02V (\ln V)^3$$

$$17150 + 34.3 (\ln V)^3 + 10V + 0.02V (\ln V)^3 = 0.3V^2$$

$$V^2 = \frac{17150 + 34.3 (\ln V)^3 + 10V + 0.02V (\ln V)^3}{0.3}$$

$$V^2 = \frac{57166.67 + 114.33 (\ln V)^3 + 33.33V + 0.0667V (\ln V)^3}{0.3}$$

$$V = \sqrt{\frac{57166.67 + 114.33 (\ln V)^3 + 33.33V + 0.0667V (\ln V)^3}{0.3}}$$

Final Equation: $V = \sqrt{\frac{57166.67 + 114.33 (\ln V)^3 + 33.33 V + 0.0667 V (\ln V)^3}{0.3}}$

MATLAB CODE

Command Window

clear

clc

format short g

V = 0.5

for i = 1:inf

iter (i) = i

$$V(i+1) = \sqrt{\frac{(57166.67 + 114.33 * (\log(V(i)))^3) + (33.33 * V(i)) + (0.0667 * V(i) * \log(V(i))^3)}{0.3}}$$


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ea(i+1) = (abs((V(i+1) - V(i)) / V(i+1)) * 100))
if ea(i+1) <= 1E-11
    break
end
end
tab = [iter 'V' 'ea']

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tab = iter	V	ea
0	0.5	0
1	239.05	99.791
2	294.17	18.736
3	302.61	2.7895
4	303.85	0.40996
5	304.04	0.060153
6	304.06	0.0086241
7	304.07	0.0012944
8	'	'
9	"	"
17	304.07	$5.9635e^{-12}$

Converges at iter = 7, to give $V = 304.07$.
Hence the converging value of the iteration was seen
as 304.07 .

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

$$\text{if } V = 304.07$$

$$\text{rem } f_p = 9.8 \times 3.5 = 34.3$$

$$= 0.3 \times (304.07)^2 - 0.02(304.07)$$

$$500 + (\ln 304.07)^3$$

$$= 34.25$$

$$\approx 34.2$$