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18/ENG04/032

Electrical Electronics Engineering.

1) 1200gallon of water, 150lb of dissolved salt

50gallon of brine, each gallon contains $(1+\sin t)$ lb of dissolved salt

Rate = 30gal per minute

$\therefore \frac{dy}{dt} = y_{in} - y_{out}$

$y_{in} = 50\frac{gal}{min} \times (1+\sin t)\frac{lb}{gal} =$

$y_{in} = 50(1+\sin t)\frac{lb}{min}$

$y_{out} = \frac{30}{1200} = 0.025 = 2.5\%$ of ng or m

$\frac{dy}{dt} = 50(1+\sin t) - 2.5\% y$

$\cancel{\frac{dy}{dt} = \ldots}$

$\frac{dy}{dt} = 50(1+\sin t) - 0.025y$

$\frac{dy}{dt} = -0.025y + 50(1+\sin t)$

$\frac{dy}{dt} = -0.025\left(\frac{-0.025}{0.025}y - \frac{50}{-0.025}(1+\sin t)\right)$

$\frac{dy}{dt} = -0.025(y - 2000(1+\sin t))$

$\frac{dy}{y - 2000(1-\sin t)} = -0.025dt$

$\int \frac{dy}{2000(1-\sin t)} = \int -0.025dt$

$\ln(y - 2000(1-\sin t) = -0.025t + C$

$y - 2000(1-\sin t) = e^{-0.025t + C}$

$y - 2000(1-\sin t) = e^{-0.025t} e^{C}$

$y - 2000(1-\sin t) = e^{-0.025t} y_0$ or m_0

$y - 2000(1-\sin t) = y_0 e^{-0.025t}$

when $t = 0$ mins initially $y = 150$lb

$150 - 2000 = y_0$

$\therefore y_0 = -1850$

$\therefore y = 2000(1-\sin t) - 1850e^{-0.025(t)}$

USING MATHLAB

1) commandwindow

2) clear

3) clc

4) close all

5) syms mt

6) ans = dsolve('Dm + 0.025* m = 50 x 50* sin(t)', 'm(0) = 150')

7) t=0:0.5:450

8) tn = subs(ans, t)

9) plot(t, tn).

```
commandwindow
clear
clc
close all
syms t
y = (50/0.05)+((50/1.0025)*sin(t))+(((50*(0.05))/1.0025)*cos(t)
ym = 1000-(800*exp(-0.05*t))
oddValues = 1:2:500
evenValues = 2:2:500
ym = double(subs(y, oddValues))
ymm = double (subs(ym, evenValues))
totTime = 1:1:500
timeTrans = totTime'
c = reshape([ym,ymm],[],1)
combVal = double(c)
plot(totTime, c)
grid on
grid minor
xlabel('T(min)'), ylabel('V(litre)')
col_header = {'t(min)', 'V(Litre)'}
xlswrite['odevbesdata.xlsx',col_header,'veriler','A2')
xlswrite['odevbesdata.xlsx',timeT,'veriler','A3')
xlswrite['odevbesdata.xlsx',combined,'veriler','B2')
```

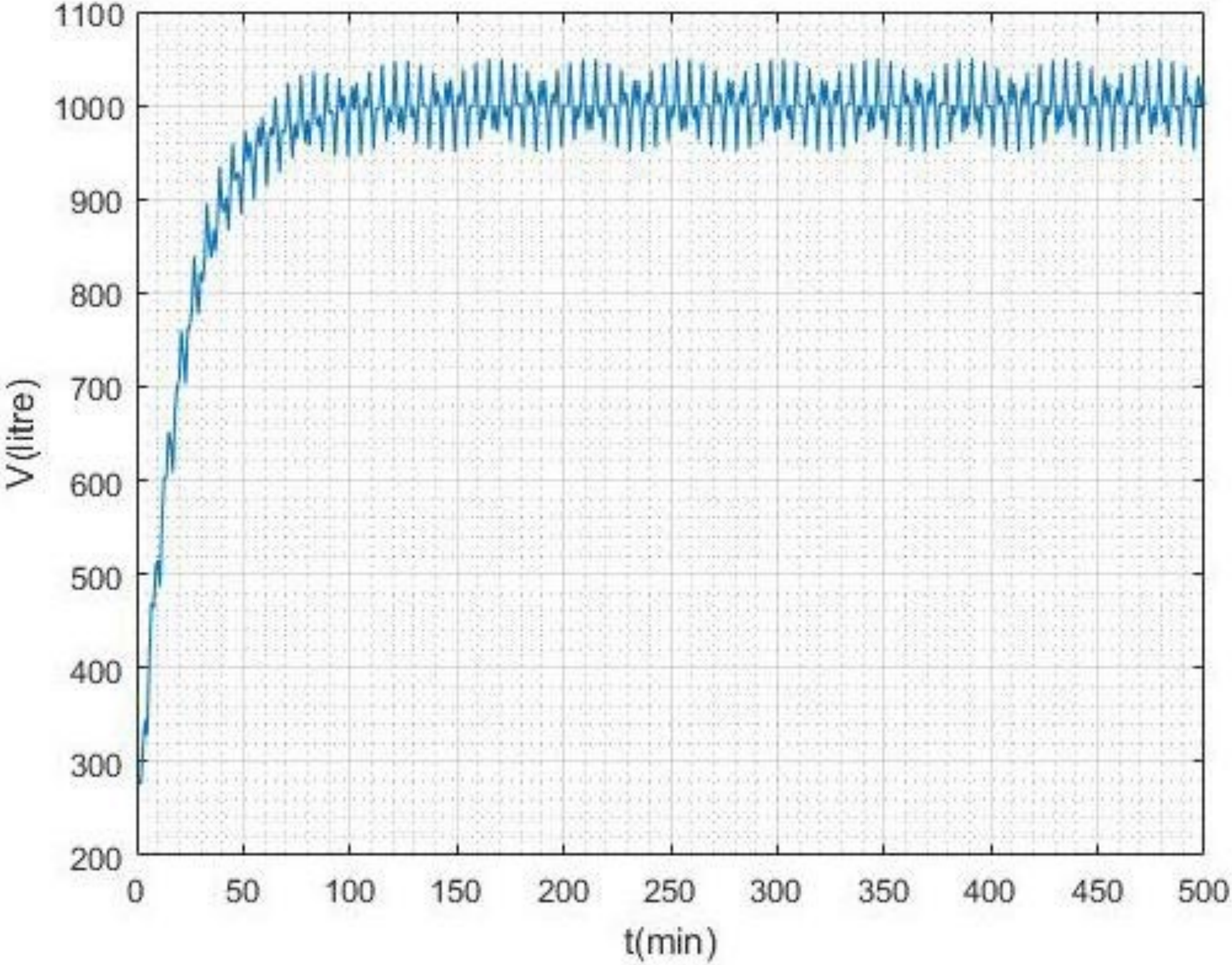
Workspace

Name	Value
c	62750x1 double
combVal	62750x1 double

script

Ln 23 Col 53

6:52 PM
5/6/2020


1100
1000
900
800
700
600
500
400
300
200
V(litre)
0
50
100
150
200
250
300
350
400
450
500
t(min)