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19/Eng07/024

Petroleum engineering

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PET ENGINEERING

1)(a) $\frac{dm}{dt} = m_{in} - m_{out}$

$m_{in} = 50 \times (1 + \sin t)$
$= 50(1 + \sin t)$

$30/1200 = 1/40$
$= 0.025$

$m_{out} = 0.025m$

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

$\frac{dm}{dt} + 0.025m = 50(1 + \sin t)$

$IF = e^{\int P dt}$
$= e^{0.025t}$
$= e^{1/40 t}$

$m \cdot e^{1/40 t} = 50 \int (1 + \sin t)(e^{1/40 t})$

Solving the right hand side

$\int u dv = uv - \int v du$

Let $u = \sin t$

$dv = e^{1/40 t}$

$du = \cos t$

$\int dv = v = 40^{1/40 t}$

$= (\sin t \cdot 40e^{1/40 t}) - \int (40e^{1/40 t}) \cdot \cos t$

$= 40 \sin t e^{1/40 t} - 40 [(\cos t \cdot 40^{1/40 t}) + \int 40e^{1/40 t} \cdot \sin t)]$

$I = (\sin t)(40e^{1/40 t}) - 40 [\cos t (40e^{1/40 t})] - 1600$

$50 \int e^{1/40 t} = 2000 e^{1/40 t}$

$$me^{\frac{1}{40}t} = 2000e^{\frac{1}{40}t} + 50t$$

$t = 0$, $m = 150\,lb$, $C = 1800 \cdot 03$

$$m = 2000 - \frac{2000(\sin t)}{1601} - \frac{80000e^{\frac{1}{40}t}}{1601}$$

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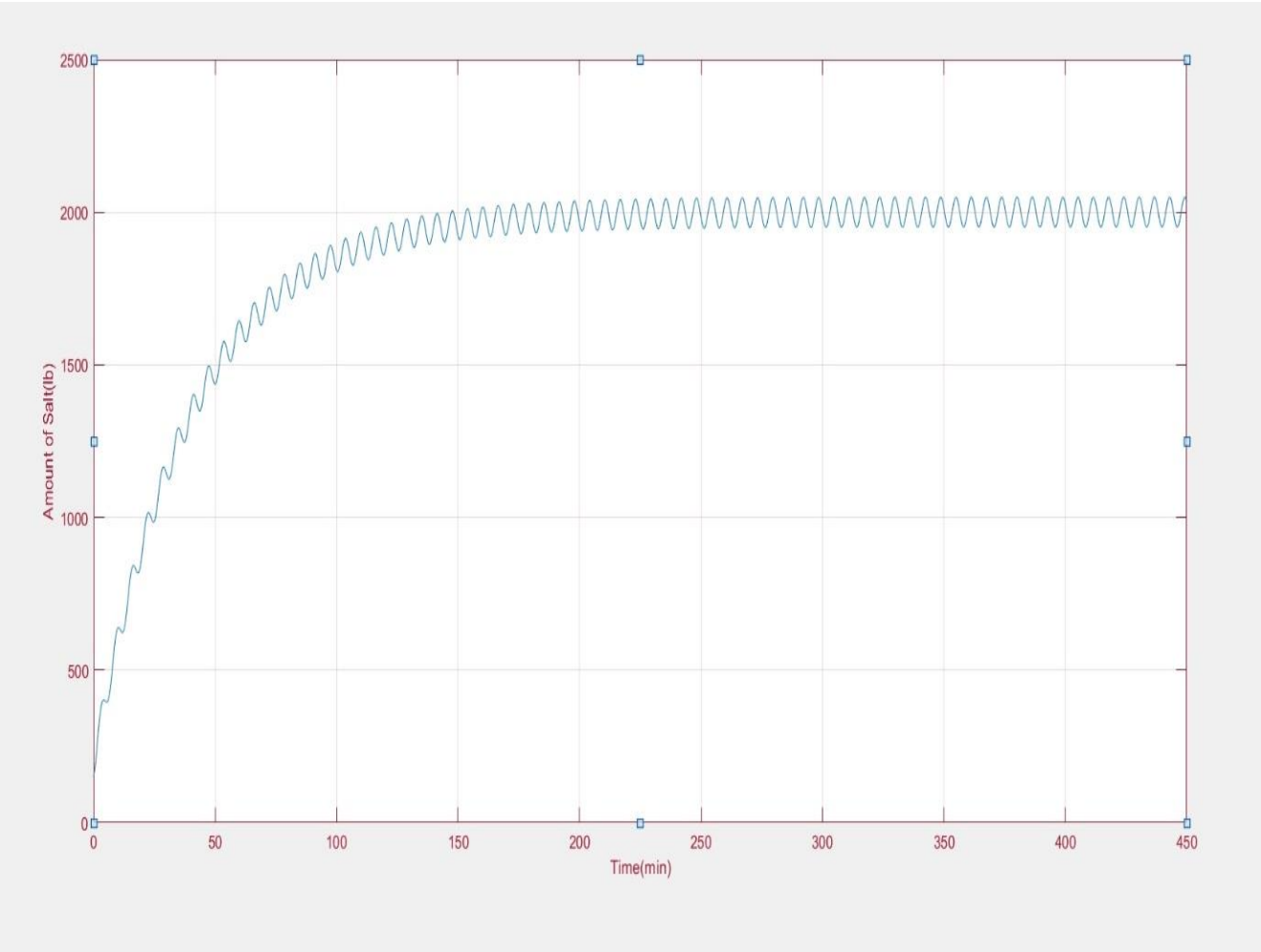
commandwindow
clear
clc
close all
syms m t
Answer=dsolve('Dm+0.025*m=50*(1+sin(t))', 'm(0)=150')
t=0:0.5:450
M=subs(answer,t)
plot(t,M)
grid on
```


2500
2000
1500
1000
500
0
Amount of Salt(lb)
0
50
100
150
200
250
300
350
400
450
Time(min)

```
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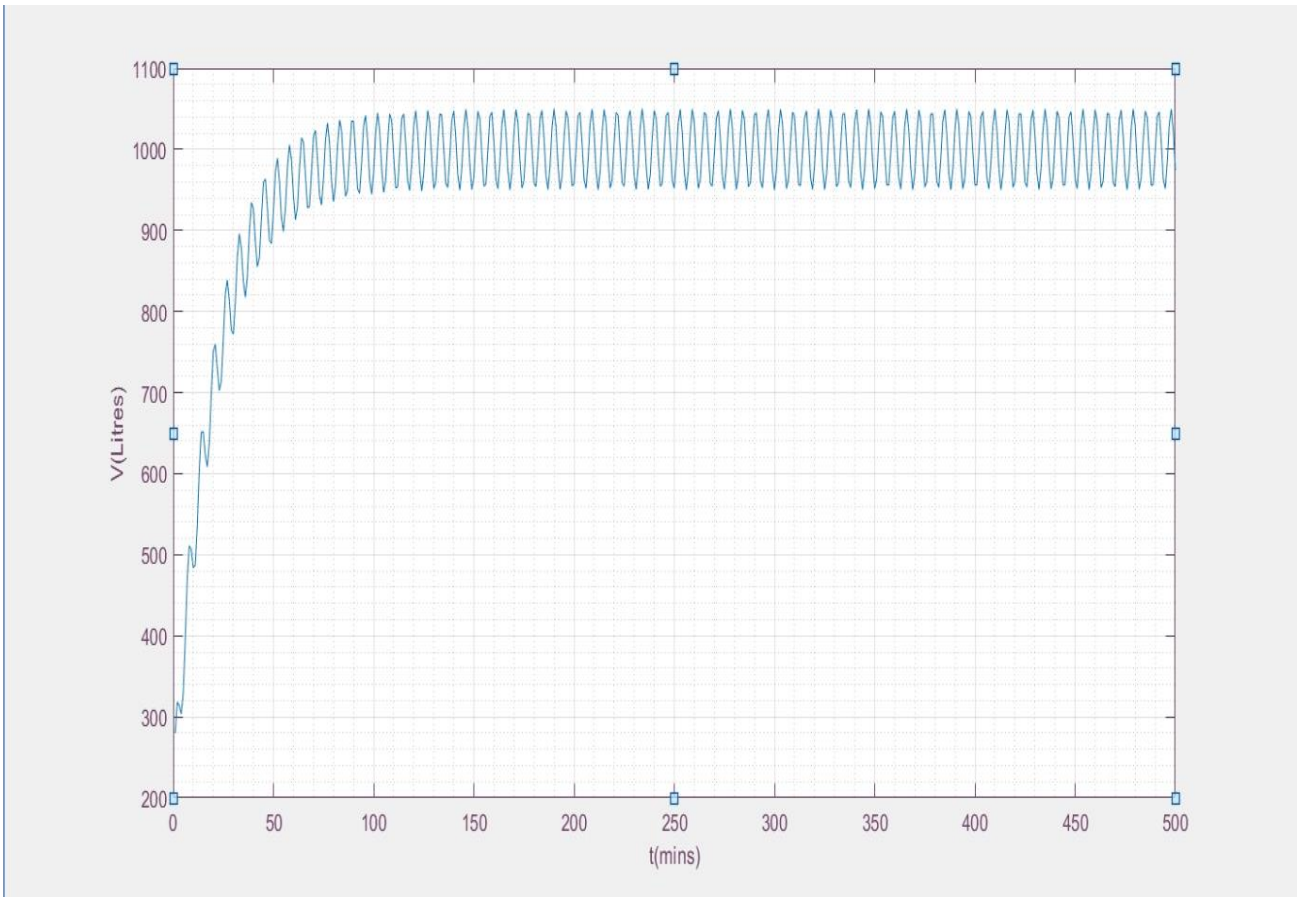
commandwindow
clear
clc
close all
syms t
values = []
t = 1:1:500
y = (1000) + ((50/1.0025)*sin(t)) + (((2.5)/1.0025)*cos(t)) - (802.49*exp(-0.05*t))
mean = 1000 - (800*exp(-0.05*t))
if rem(t,2) == 0
    values = [values,mean]
 else
    values = [values,y]
 end
 excelvalues = transpose(values)
 mins = transpose(t)
 plot(t,values)
 grid on
 grid minor
 xlabel('t(mins)')
 ylabel('V(Litres)')
 xlswrite('odevbesdata.xlsx', {'t(min)'}, 'veriler', 'A1')
 xlswrite('odevbesdata.xlsx', mins, 'veriler', 'A2')
 xlswrite('odevbesdata.xlsx', {'V(Litre)'}, 'veriler' , 'B1')
 xlswrite('odevbesdata.xlsx', xlresponses, 'veriler', 'B2')
```


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