

Problem 4-9

PROB4_9.M

```
% use of ODE45
clc, clg, clear
% Input Data
Vd=8; L=5e-6; C=100e-6; rL=1e-3; R=1.0; fs=100e3; Vcontrol=0.75;
Ts=1/fs; tmax=50*Ts; deltat=Ts/50;
%
x0=[4.0 5.5]';
t0=0;
tf=500e-6;
[t, x] = ode45('xdot_dis', t0, tf, x0);
plot(t, x)
```

XDOT_DIS.M

```
function xdot=xdot_dis(t, x)
% used with Prob4_9.m
% Input Data
Vd=8; L=5e-6; C=100e-6; rL=1e-3; R=10; fs=100e3; Vcontrol=0.75;
Ts=1/fs; tmax=50*Ts; deltat=Ts/50;
%
vst=t/Ts - fix(t/Ts);
voi=Vd* (Vcontrol > vst);
%
xdot(1) = -rL/L*x(1) - (1/L)*x(2) + (1/L)*voi;
%
if x(1) <= 0
    if xdot(1) <= 0
        x(1)=0; xdot(1)=0; voi=x(2);
    end
end
%
xdot(2) = 1/C*x(1) - 1/(C*R)*x(2);
```

