1. **Euler’s Forward Method**

**Code:**

clc

clear all

R=0.0001;

L=0.1;

C=0.5;

g=0:0.01:10;

Vn=1;

tf=10;

I= sqrt(C/L)\*Vn\*sin(g/sqrt(L\*C));

A=[-R/L -1/L; 1/C 0];

B=[1/L ; 0];

h=0.01;

nos1 = round(tf/h);

I1(1)=0; %for t =1

vc(1)=0; %for t =1

for i=1:nos1

I1(i+1)= I1(i)+h\*(I(i)\*A(1,1) +A(1,2)\*vc(i)+B(1)\*Vn);

vc(i+1)=vc(i)+(A(2,1)\*h\*I1(i));

end

h1=0.001;

g1=0:0.001:10;

nos2 = round(tf/h1);

I2(1)=0; %for t =1

vc2(1)=0; %for t =1

for j=1:nos2

I2(j+1)= I2(j)+h1\*(I2(j)\*A(1,1) +A(1,2)\*vc2(j)+B(1)\*Vn);

vc2(j+1)=vc2(j)+(A(2,1)\*h1\*I2(j));

end

subplot(3,1,1)

plot(g,I)

title('Subplot 1:Original Signal');

xlabel('Time (sec)');

ylabel('Current (A)');

subplot(3,1,2)

plot(g,I1)

title('Subplot 2: Step size =0.01');

xlabel('Time (sec)');

ylabel('Current (A)');

subplot(3,1,3)

plot(g1,I2)

title('Subplot 3: Step size =0.001');

xlabel('Time (sec)');

ylabel('Current (A)');

**Graph:**

****

1. **Euler’s Backward Method**

**Code:**

clc

clear all

R=0.0001;

L=0.1;

C=0.5;

g=0:0.01:10;

Vm=1;

tf=10;

I= sqrt(C/L)\*Vm\*sin(g/sqrt(L\*C));

A=[-R/L -1/L; 1/C 0];

B=[1/L ; 0];

h=0.01;

nos1 = round(tf/h);

X = 1 + (h\*R/L) + (h\*h/L/C);

Adj = (1/X);

I1(1)=0; %for t =1

vc(1)=0; %for t =1

for i=1:nos1

I1(i+1)=Adj\*(I1(i)+(h\*vc(i)\*A(1,2))+B(1)\*Vm\*h);

vc(i+1)=Adj\*(vc(i)\*(1+(R\*h/C))+(A(2,1)\*h\*I1(i)));

end

h1=0.001;

g1=0:0.001:10;

nos2 = round(tf/h1);

X1 = 1 + (h1\*R/L) + (h1\*h1/L/C);

Adj1=1/X1;

I2(1)=0; %for t =1

vc2(1)=0; %for t =1

for j=1:nos2

I2(j+1)=Adj1\*(I2(j)+(h1\*vc2(j)\*A(1,2))+B(1)\*Vm\*h1);

vc2(j+1)=Adj1\*(vc2(j)\*(1+(R\*h1/C))+(A(2,1)\*h1\*I2(j)));

end

subplot(3,1,1)

plot(g,I)

title('Subplot 1:Original Signal');

xlabel('Time (sec)');

ylabel('Current (A)');

subplot(3,1,2)

plot(g,I1)

title('Subplot 2: Step size =0.01');

xlabel('Time (sec)');

ylabel('Current (A)');

subplot(3,1,3)

plot(g1,I2)

title('Subplot 3: Step size =0.001');

xlabel('Time (sec)');

ylabel('Current (A)');

**Graph:**

****

1. **Trapezoidal Method**

**Code:**

clc

clear all

R=0.0001;

L=0.1;

C=0.5;

g=0:0.01:10;

Vn=1;

Vm=1;

tf=10;

I= sqrt(C/L)\*Vn\*sin(g/sqrt(L\*C));

A=[-R/L -1/L; 1/C 0];

B=[1/L; 0];

id=[1 0;0 1];

h=0.01;

nos1 = round(tf/h);

I1(1)=0; %for t =1

VC(1)=0; %for t =1

for i=1:nos1

M = [I1(i); VC(i)];

D = (inv(id-A\*h/2))\*(((id+(A\*h/2))\*M) + (h\*B\*(Vn+Vm)/2));

I1(i+1) = D(1, 1);

VC(i+1) = D(2, 1);

end

h1=0.001;

g1=0:0.001:10;

nos2 = round(tf/h1);

I2(1)=0; %for t =1

VC2(1)=0; %for t =1

for j=1:nos2

M1 = [I2(j); VC2(j)];

D1 = (inv(id-A\*h1/2))\*(((id+(A\*h1/2))\*M1) + (h1\*B\*(Vn+Vm)/2));

I2(j+1) = D1(1, 1);

VC2(j+1) = D1(2, 1);

end

subplot(3,1,1)

plot(g,I)

title('Subplot 1:Original Signal');

xlabel('Time (sec)');

ylabel('Current (A)');

subplot(3,1,2)

plot(g,I1)

title('Subplot 2: Step size =0.01');

xlabel('Time (sec)');

ylabel('Current (A)');

subplot(3,1,3)

plot(g1,I2)

title('Subplot 3: Step size =0.001');

xlabel('Time (sec)');

ylabel('Current (A)');

**Graph:**

****