```
clear all
clc
close all
format short

% Cálculo numérico para engenharia elétrica com Matlab
% Capítulo 7: equações diferenciais ordinárias
% di/dt=f(i,t)=(1/L)(vm-ri)
% Sistema EDO
% RLC sem fonte
% 1 - dy1/dt = y2
% 2 - dy2/dt = -(R/L)*y2 - y1/(L*C)
% dydt = [y(2); (-R/L)*y(2)-y(1)/(L*C)]
% R = 100;
% L = 0.1;
% C = 0.000001;

ti = 0; tf = 0.01;
y0 = [0 100];
h = 1e-6;
t = (ti:h:tf)';

tt = t(1); y = y0;
np = 1; tp(np) = tt; yp(np,:) = y(1,:);
i=1;
while(1)
  tend = t(np+1);
  hh = t(np+1) - t(np);
  if hh>h,hh = h;end
  while(1)
    if tt+hh>tend,hh = tend-tt;end
    k1 = dydt(tt,y(i,:))';
    ymid = y(i,:) + k1.*hh./2;
    k2 = dydt(tt+hh/2,ymid)';
    ymid = y(i,:) + k2*hh/2;
    k3 = dydt(tt+hh/2,ymid)';
    yend = y(i,:) + k3*hh;
    k4 = dydt(tt+hh,yend)';
    phi = (k1+2*(k2+k3)+k4)/6;
    y(i+1,:) = y(i,:) + phi*hh;
    tt = tt+hh;
    i=i+1;
    if tt>=tend,break,end
  end
  np = np+1; tp(np) = tt; yp(np,:) = y(i,:);
  if tt>=tf,break,end
end

t = linspace(ti,tf,size(y,1));

fig = figure;
left_color = [0 0 0];
right_color = [0 0 0];
set(fig,'defaultAxesColorOrder',[left_color; right_color]);
yyaxis left
plot(t,y(:,2),'k-','LineWidth',2), grid on, hold on
```

```
ylabel('Tensão (V)')
axis([0 0.01 -100 100])
yyaxis right
plot(t,y(:,1),'k--','LineWidth',2), grid on, hold on
ylabel('Corrente (A)')
axis([0 0.01 -0.03 0.03])
legend('Tensão (V)','Corrente (A)')
xlabel('Tempo (s)')

function dy = dydt(t,y)

dy = [y(2);(-100/0.1)*y(2)-y(1)/(0.1*0.000001)];

end
```