

```
clear all;

tstart=0;
tfinal=10;
tspan=[tstart, tfinal]; % time duration for calculation

theta0 = 0; % initial displacement of the bar
omega0 = 0; % initial angular velocity of the bar
x0=[theta0, omega0]; % initial conditions for ODE variable

[t,x]=ode45('R', tspan, x0);
% ODE45 is used to solve linear or non-linear differential equations
% 4th and 5th order Runge-Kutta method to integrate the equations
% Note that the equations of motion in state space form are in a subprogram
% named R

figure(1); clf;
subplot(3,1,1),plot(t,x(:,1)*180/pi), xlabel('t [s]'), ylabel('theta [deg]'), grid;
subplot(3,1,2),plot(t,x(:,2)), xlabel('t [s]'), ylabel('omega [rad/s]'), grid;
subplot(3,1,3),plot(x(:,1),x(:,2)), xlabel('theta [rad]'), ylabel('omega [rad/s]'), grid;
```