

```

clear all;
clc;

%%%%%%%%%%%%%
% Parameters %
%%%%%%%%%%%%%

m = 1;
omega0 = 1;
beta = .1;

A = -(sqrt(beta^2-omega0^2) + beta)/2*sqrt(beta^2-omega0^2); % for initial conditions:
B = -(sqrt(beta^2-omega0^2) - beta)/2*sqrt(beta^2-omega0^2); % x(0) = 1 and v(0) = 0

t = [0:.001:20];

%%%%%%%%%%%%%
% Time evolution
% x -> position
% v -> velocity
% E -> total energy
% Eloss -> rate of change in total energy %
%%%%%%%%%%%%%

for n=1:size(t,2)
    x(n) = exp(-beta*t(n))*(A*exp(sqrt(beta^2-omega0^2)*t(n))+B*exp(-sqrt(beta^2-omega0^2)*t(n)));
    v(n) = exp(-beta*t(n))*(A*(sqrt(beta^2-omega0^2)-beta)*exp(sqrt(beta^2-omega0^2)*t(n))-B*(sqrt(beta^2-omega0^2)+beta)*exp(-sqrt(beta^2-omega0^2)*t(n)));
    E(n) = 1/2*m*v(n).^2 + 1/2*m*omega0^2*x(n).^2;
    Eloss(n) = -2*beta*m*v(n).^2;
end

plot(t,x,t,v,t,E,t,Eloss)
grid on

```