

F74046242 謝耀賢

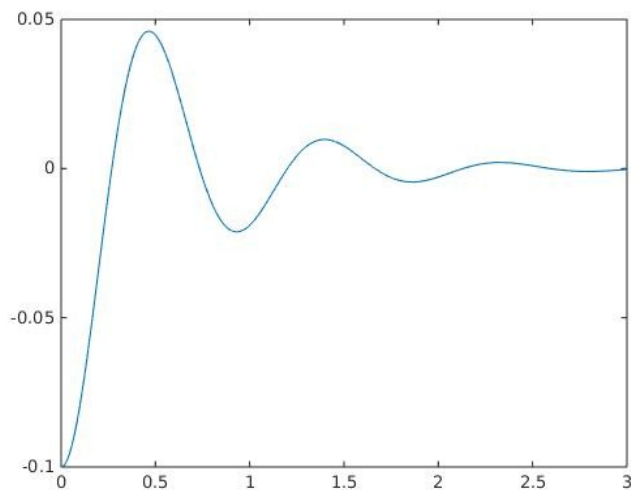
Prob1

Method : Euler Method

Step size:  $1e-5$  (h)

coordinate: the place before compress is 0, under this place(compressing) is negative, thus, the other direction is positive.

ans:



the oscillation frequency of the system is  $f=1.074275$

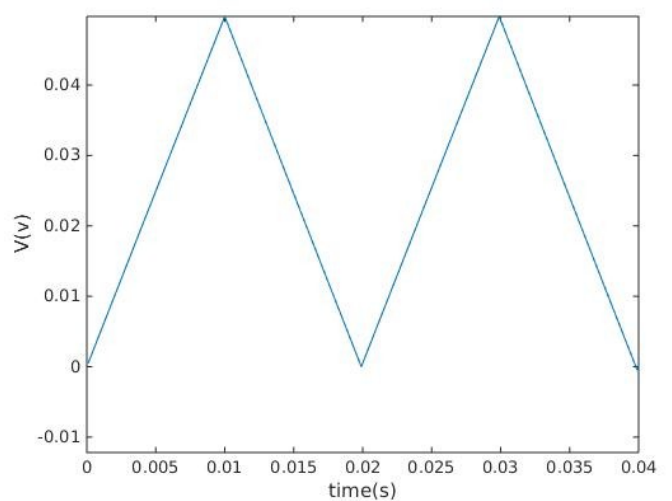
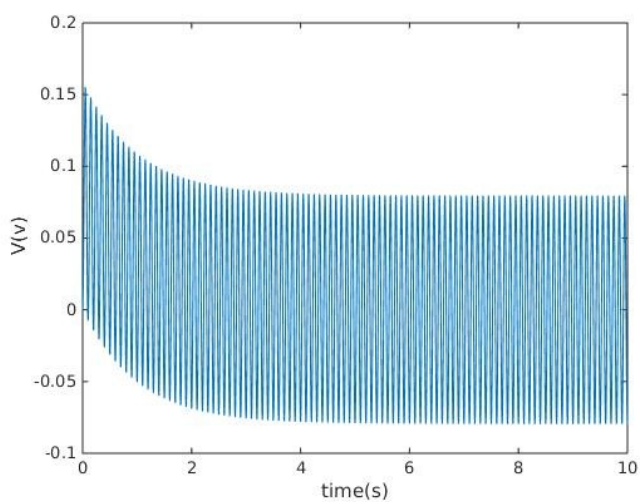
Prob2

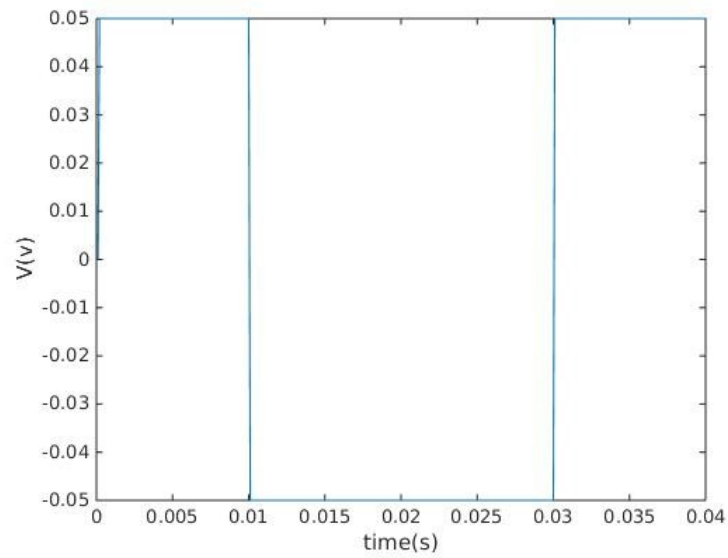
Method : Euler Method

Step size:  $1e-4$  (dt)

coordinate: where positive, and where negative is same as  $\varepsilon(t)$ .

Ans:





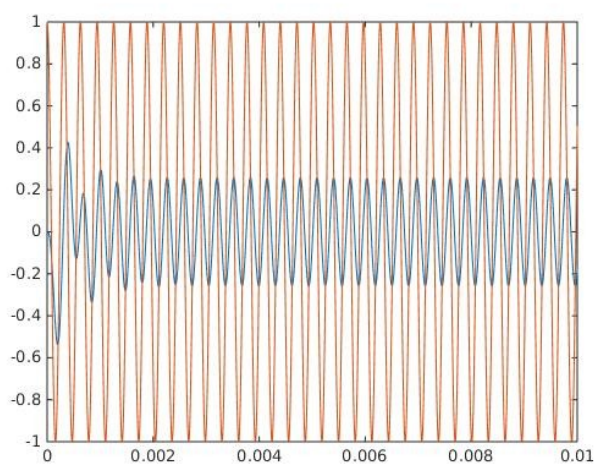
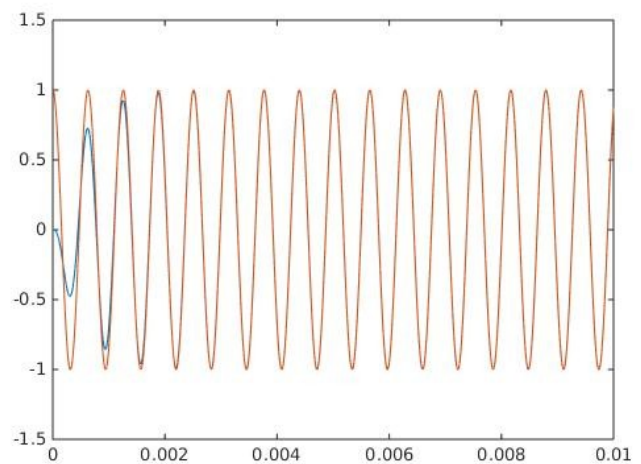
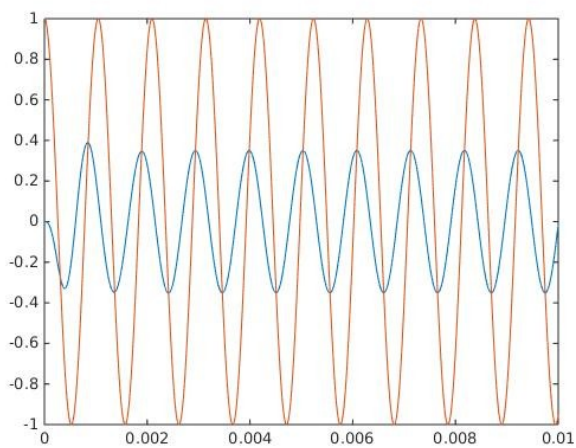
Prob3

Method : central diff, Euler Method

Step size:  $1e-6$  (h)

coordinate: where positive, and where negative is same as  $\varepsilon(t)$ .

ans:



Proof:

$$\begin{aligned}L \times \frac{dI(t)}{dt} + I(t)R + \frac{1}{C} \times \int I(t) dt &= V_s(t) \\(\text{differentiate}) \Rightarrow L \times \frac{d^2 I(t)}{dt^2} + R \times \frac{dI(t)}{dt} + \frac{I(t)}{C} &= \frac{dV_s(t)}{dt} \\ \Rightarrow \frac{d^2 I(t)}{dt^2} &= \left( \frac{dV_s(t)}{dt} - R \times \frac{dI(t)}{dt} - \frac{I(t)}{C} \right) \times \frac{1}{L}\end{aligned}$$