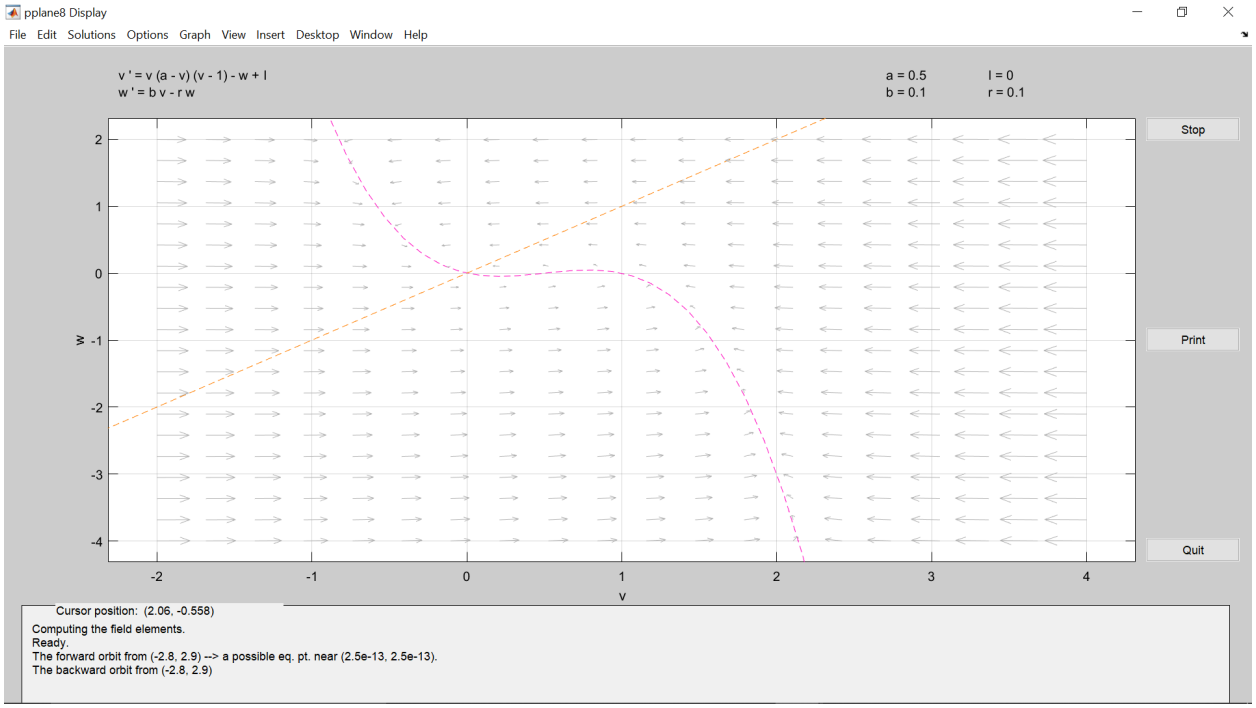
Assignment 2: Report

ME17B179

1. Case 1: lext = 0

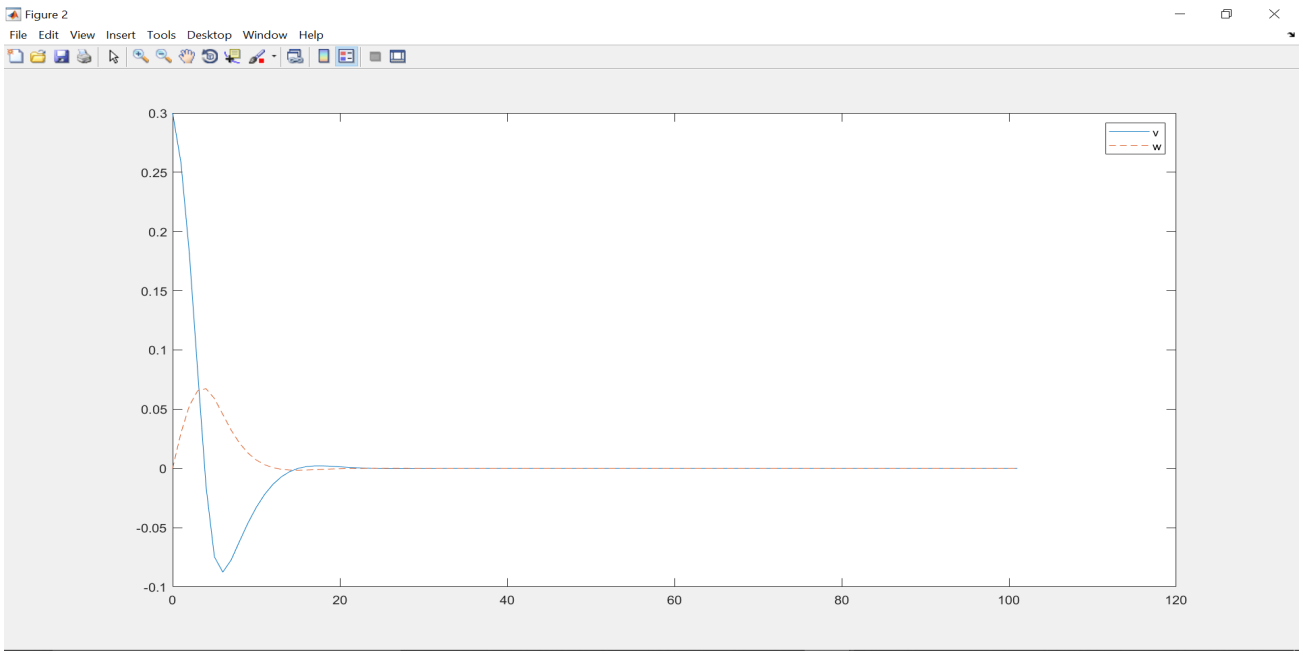
   a). Phase plane plot Superimposed



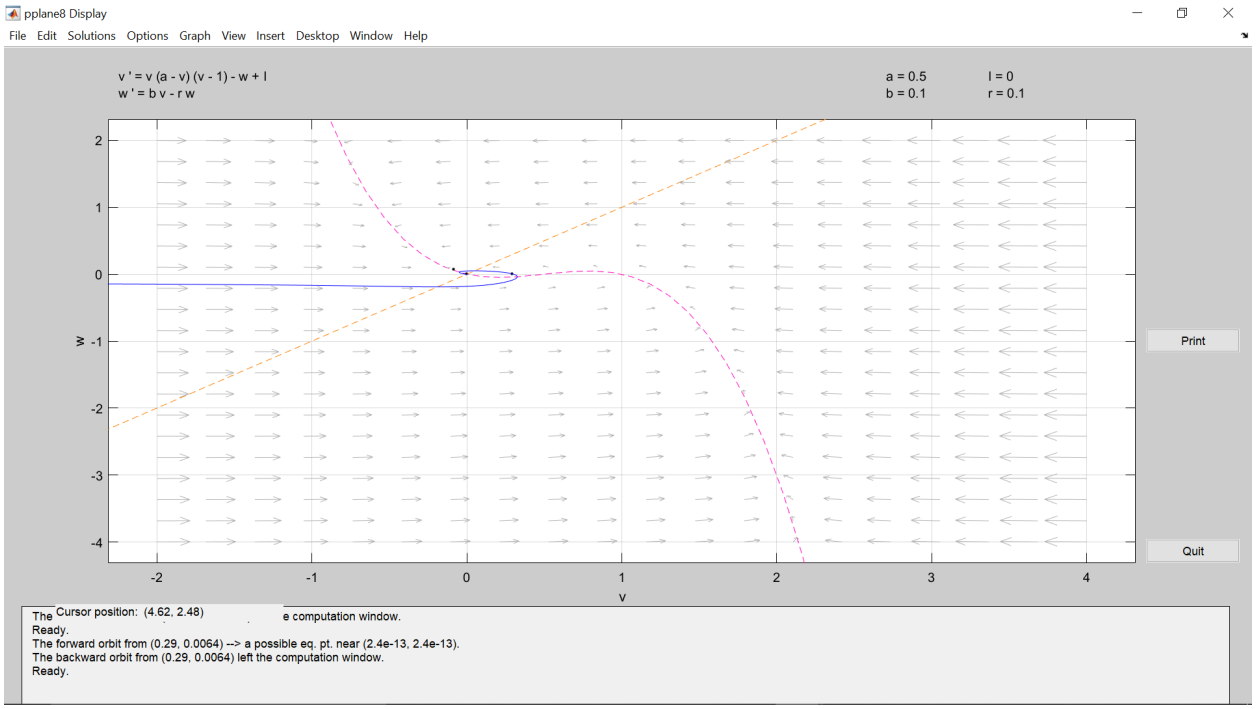
b). Plot V(t) vs t and W(t) vs t

(i). lext = 0; v0 = 0.3; w0 = 0;

Plot V(t) vs t and W(t) vs t

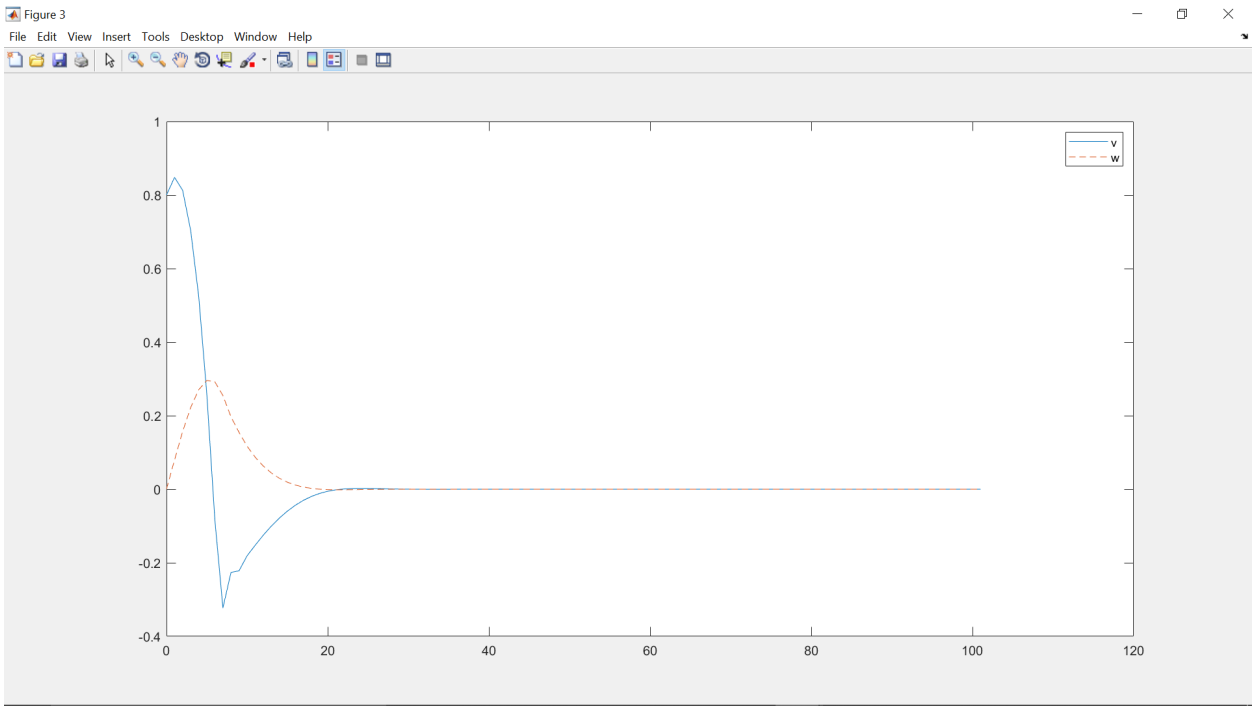


show the trajectory on the phase plane

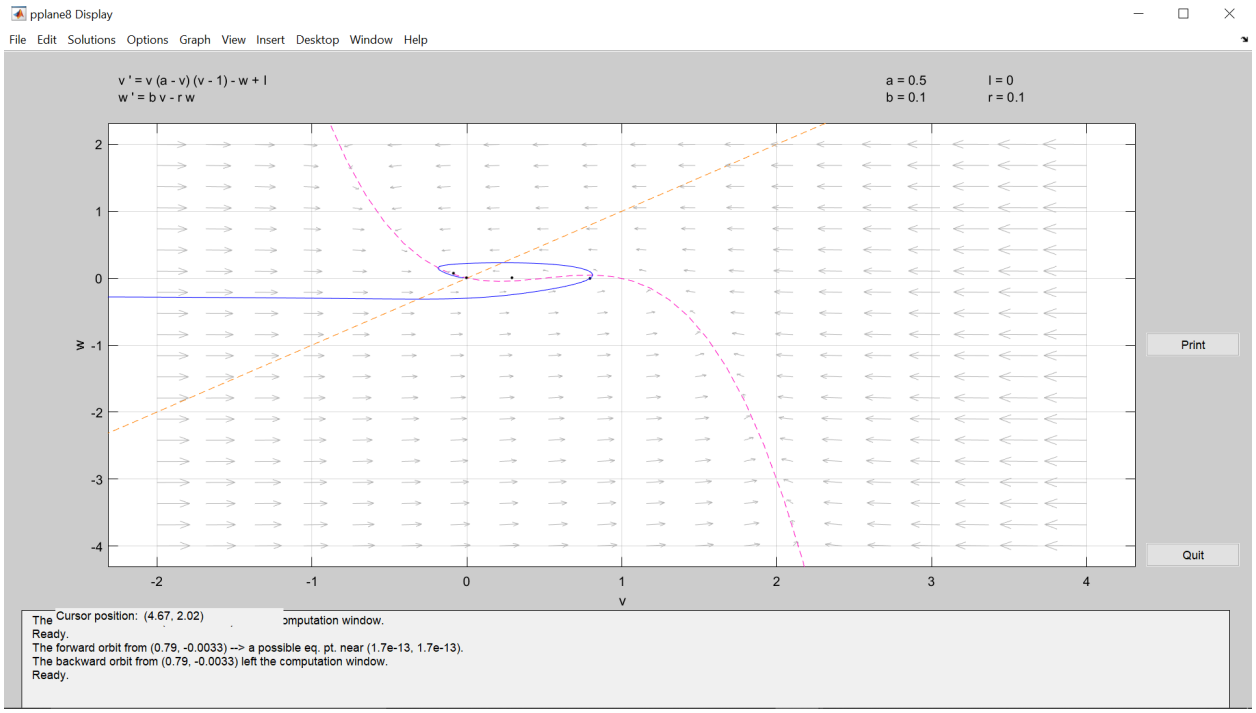


(ii). Iext = 0; v0 = 0.8; w0 = 0;

Plot V(t) vs t and W(t) vs t

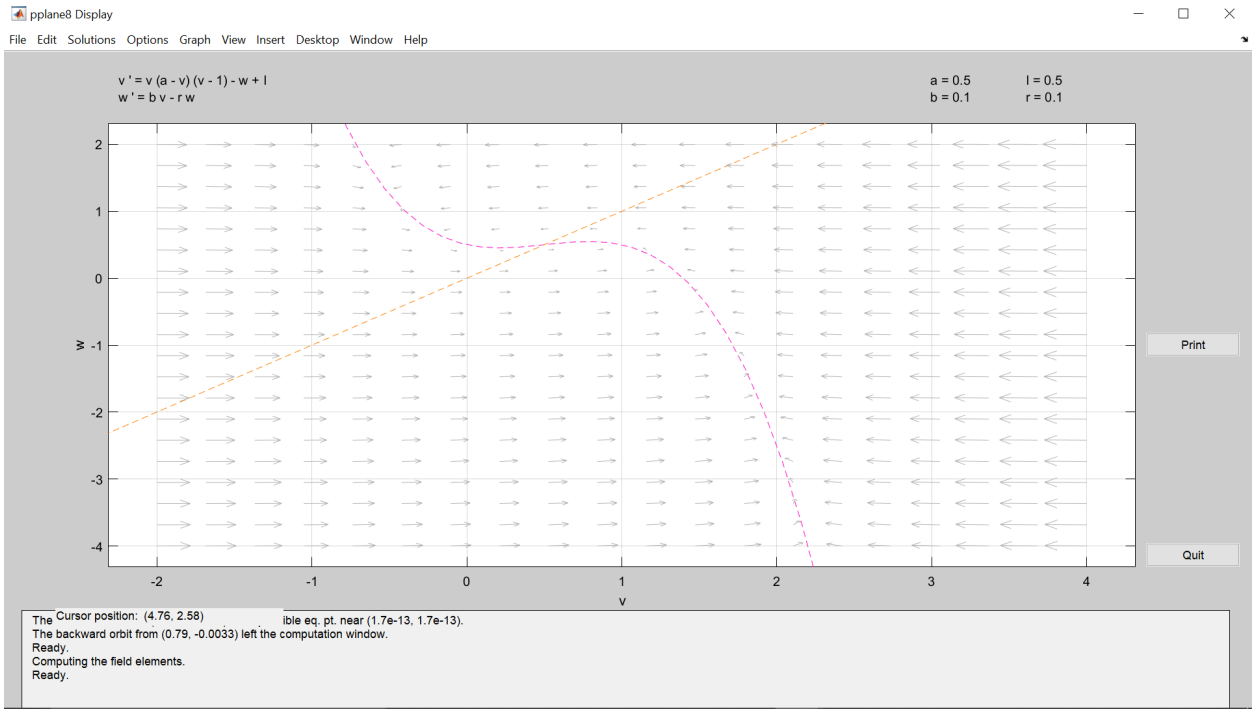


show the trajectory on the phase plane

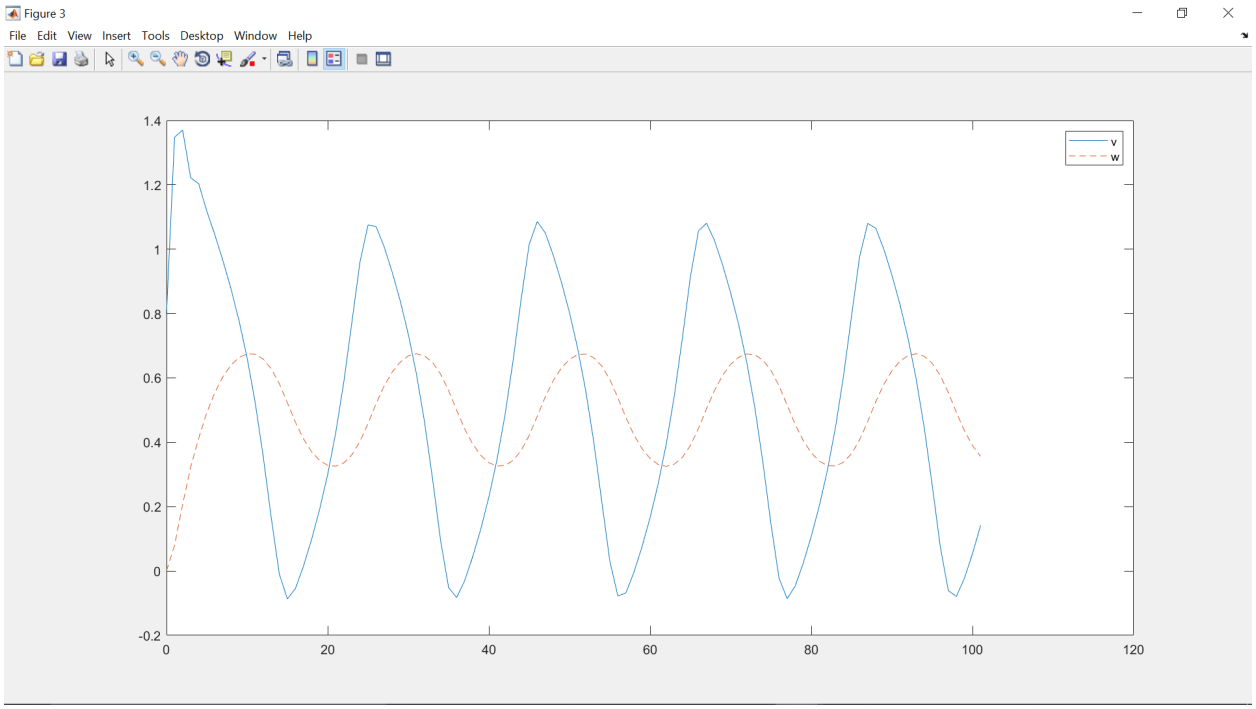


2. Case 2:
   By Iterative Analysis I found I1 to be = 0.32
   By Iterative Analysis I found I2 to be = 0.68

   (a). PhasePlot for Iext=0.5



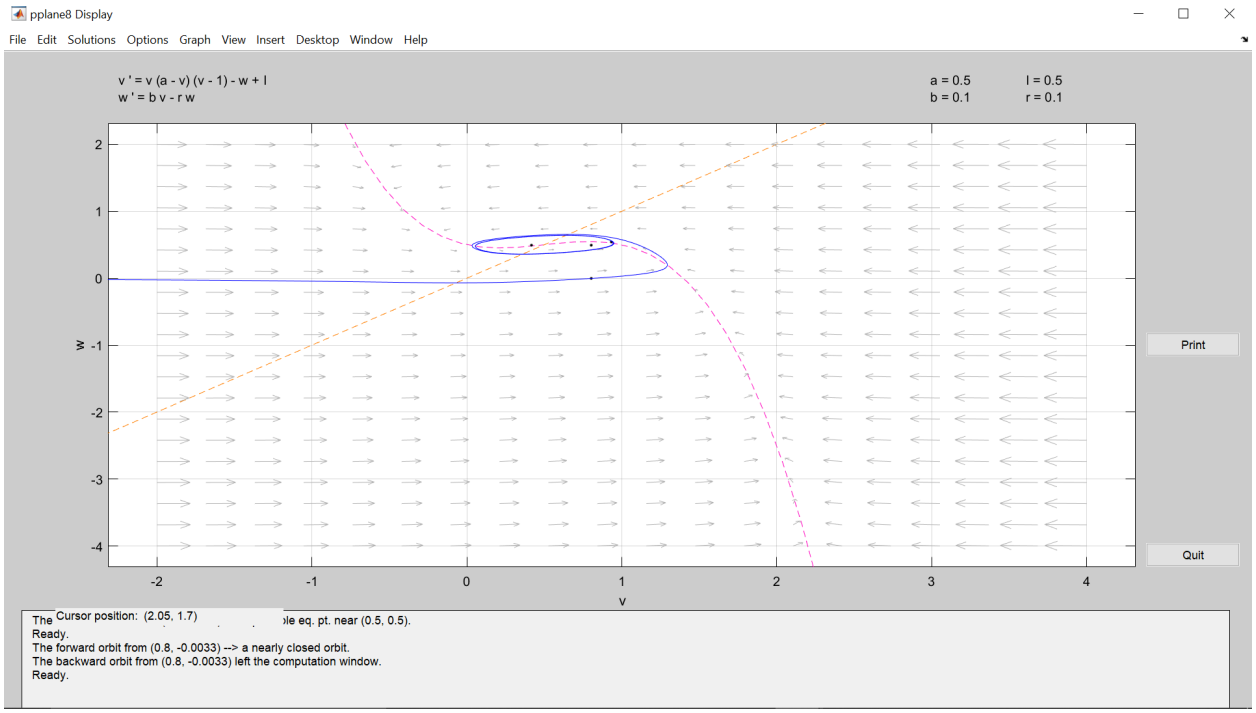
(b). Iext = 0.5, v(0) = 0.8, w(0) = 0



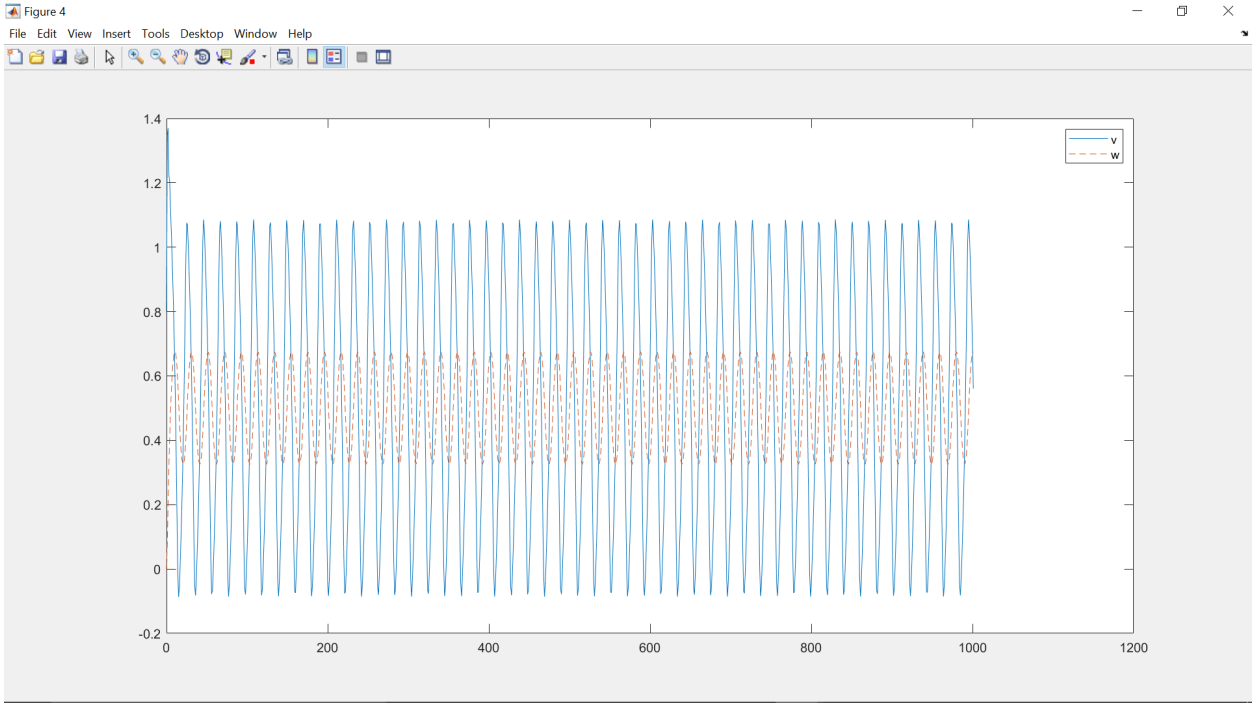
Phase plane plot:

Even for a small perturbation, there is no return to the fixed point

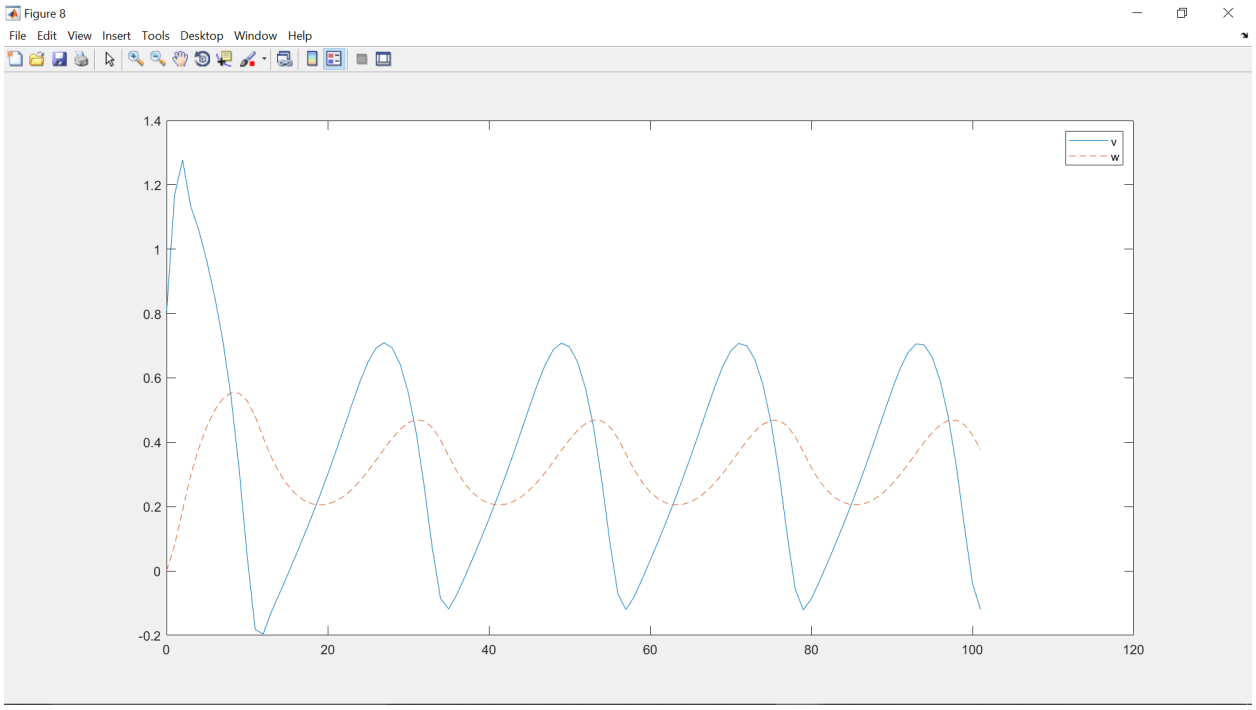
Iext = 0.5, v(0) = 0.8, w(0) = 0



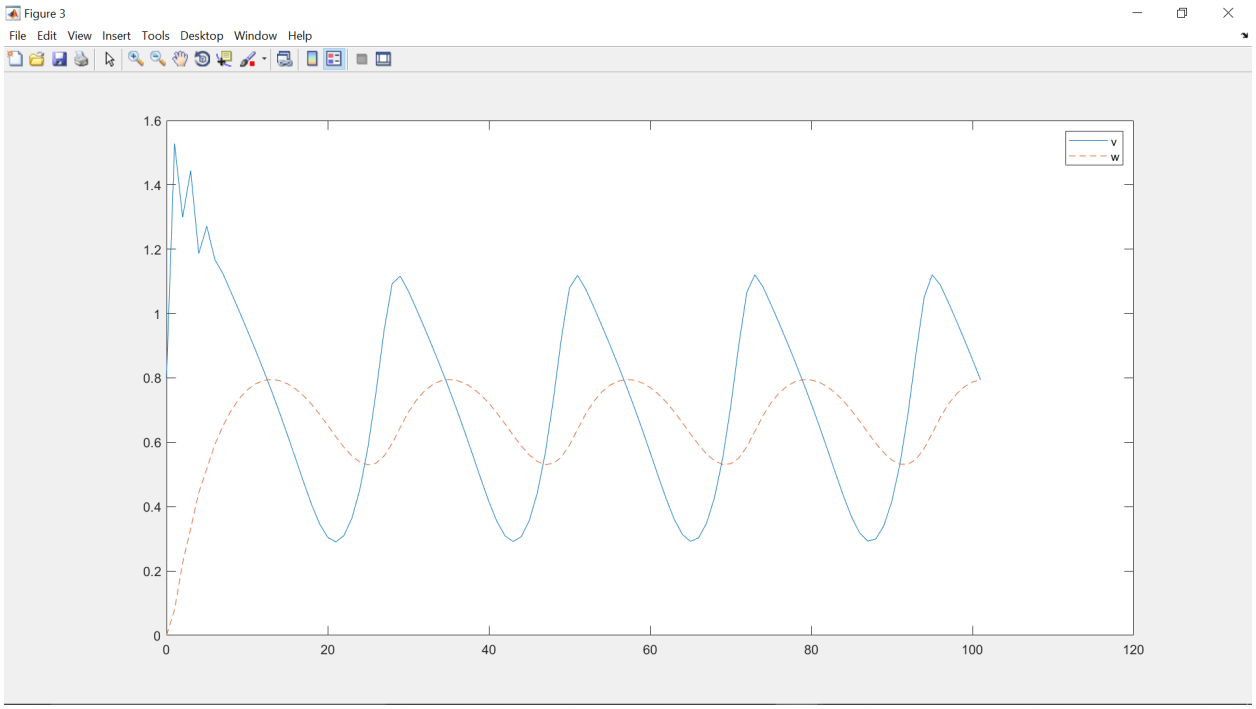
(c). Iext = 0.5, v(0) = 0.8, w(0) = 0, simulated for 1000ms



For I1 = 0.32, Simulated for 100ms

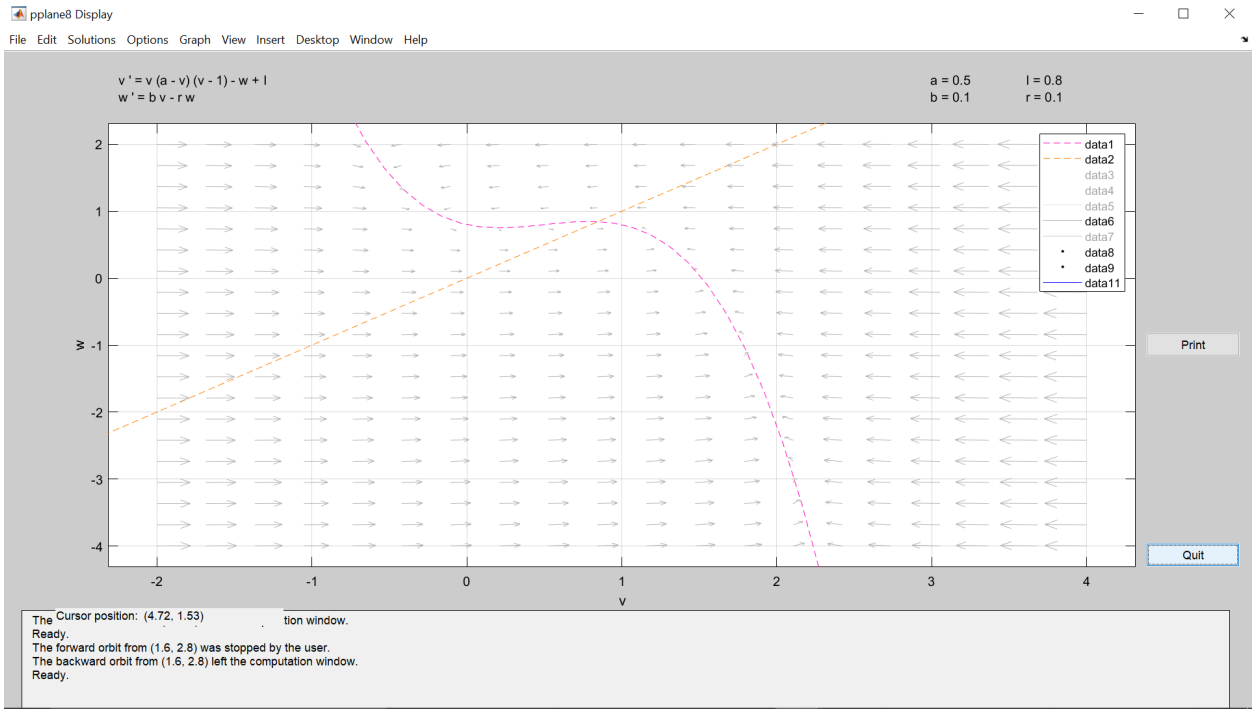


For I2=0.68, simulated for 100ms

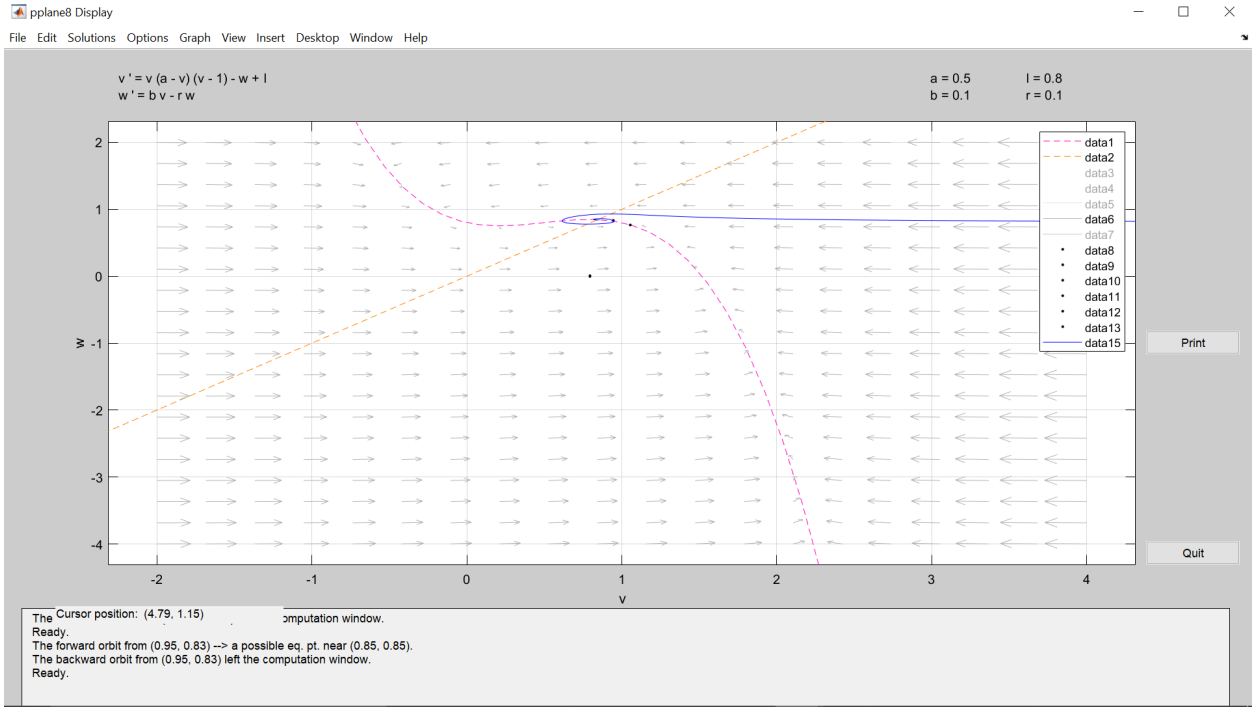


3. Case 3: Choose some Iext > I2

   (a). Phase plane plot for Iext = 0.8

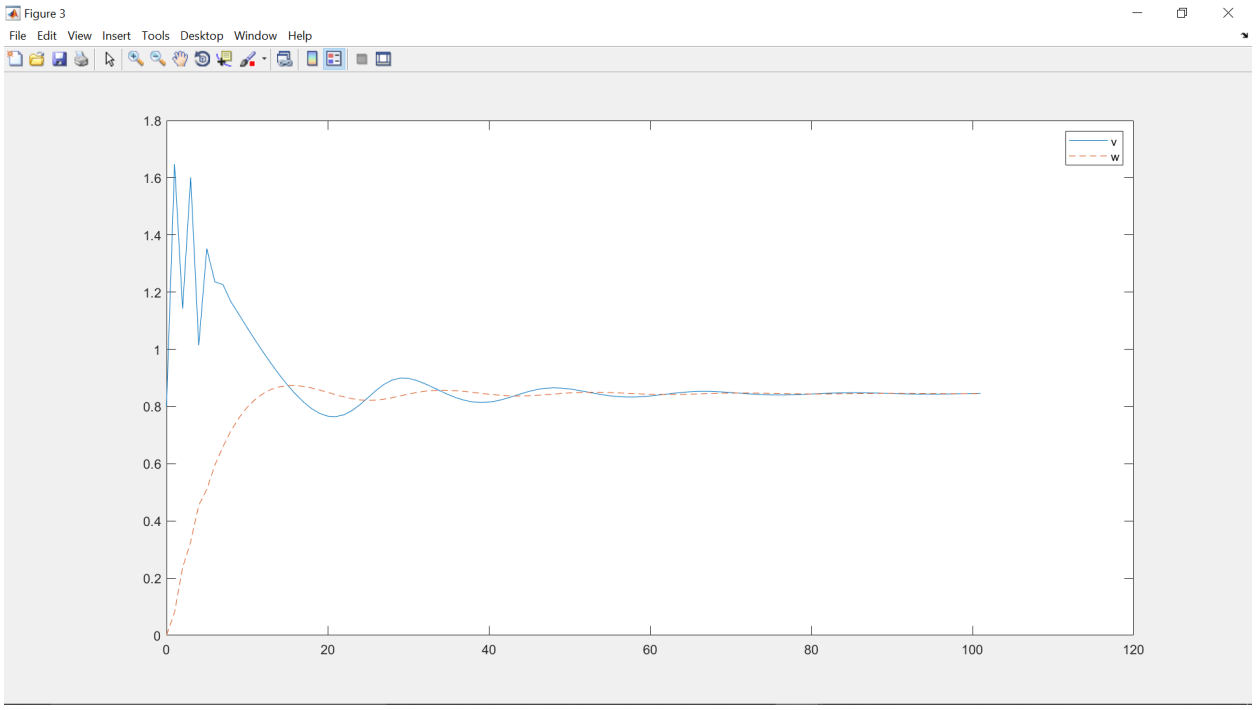


(b). For small and large perturbations, a return to the fixed point is observed

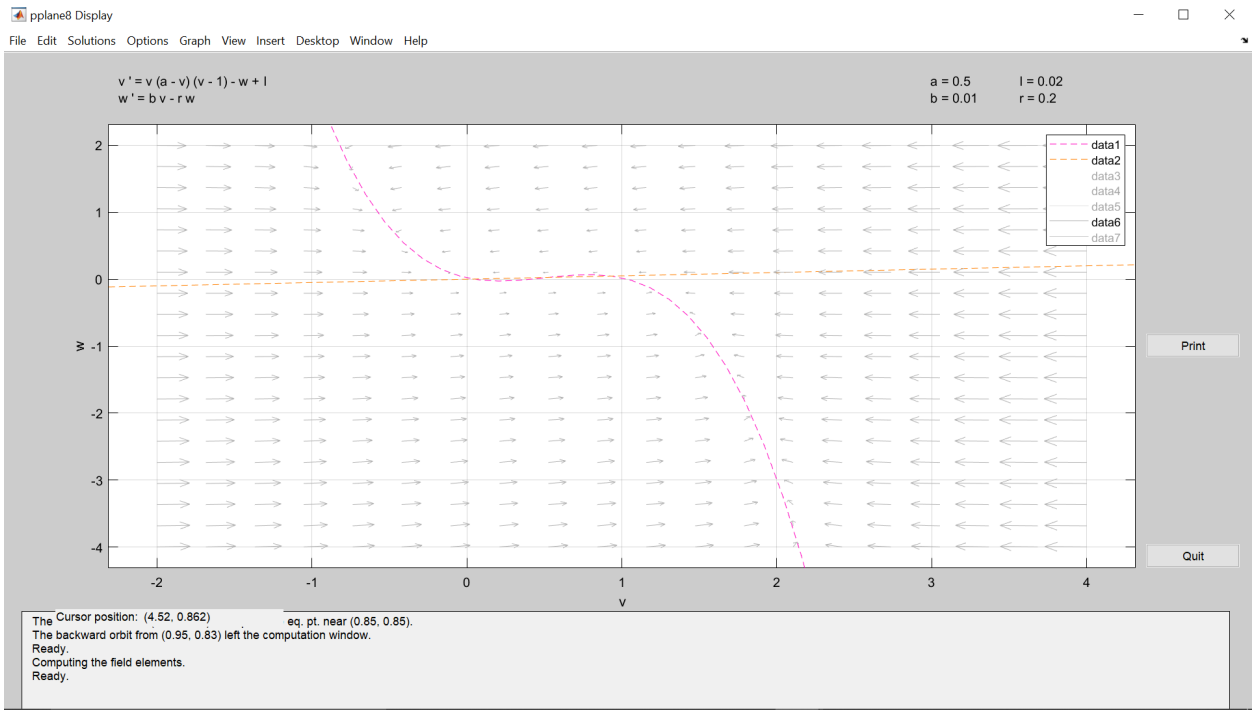


(c). Plot V(t) vs t and W(t) vs t

Iext = 0.8



4. Case 4: 3 Intersections
   (a). Iext = 0.02, a=0.5, b=0.01, r=0.2 as b/r = 0.05(approx) - phase plane plot



(b). Stability of p1,p2,p3

p1 = (v = 0.041, w = 0.0020)
p2 = (v = 0.525,w = 0.027)
p3 = (v = 0.934,w = 0.047)

Case p1:
df/dv = -0.38: Therefore it is a stable fixed point

Case p2:
df/dv = 0.25: Therefore it is a saddle point

Case p3:
df/dv = -0.32: Therefore it is a stable fixed point

(c). Plot V(t) vs t and W(t) vs t

Random Initial Condition: Iext = 0.02, v(0)=0.5, w(0)=0.5.