

Lecture 10

11.06.19

Fixed points of the system (4.9) are considered in a one-dimensional phase space on the circle with radius $\rho = 2\sqrt{\varepsilon}$, which is constructed in the plane with coordinates $\rho \sin \varphi$, $\rho \cos \varphi$ (see Fig 4.3).

Stable and unstable fixed points are shown in Fig. 4.3a, b in the system phase space for different values of parameter Δ . As can be seen from (4.11) and (4.12), for $\Delta = 0$, the coordinate of the unstable point is $\varphi_1 = 0$, while that of the stable point is $\varphi_2 = \pi$ (Fig 4.3 a).

Fig 4.3 Phase portrait of system (4.9)

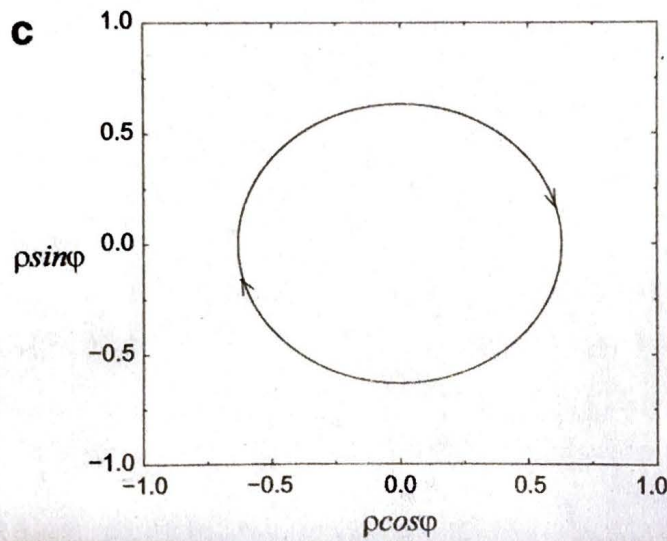
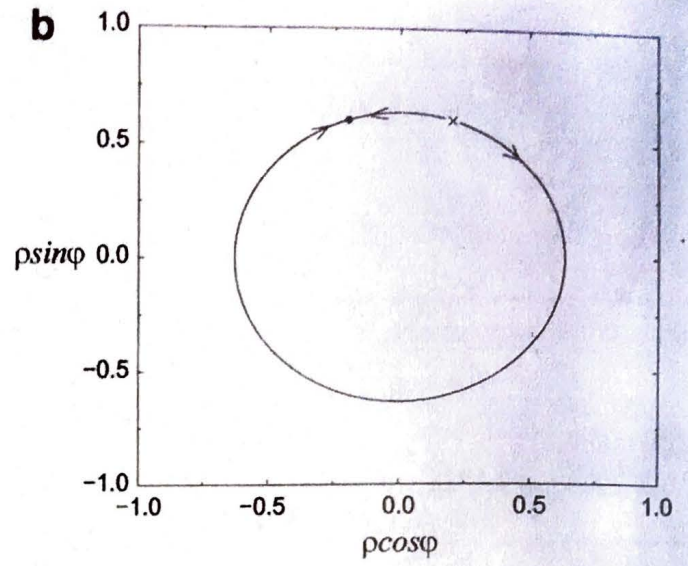
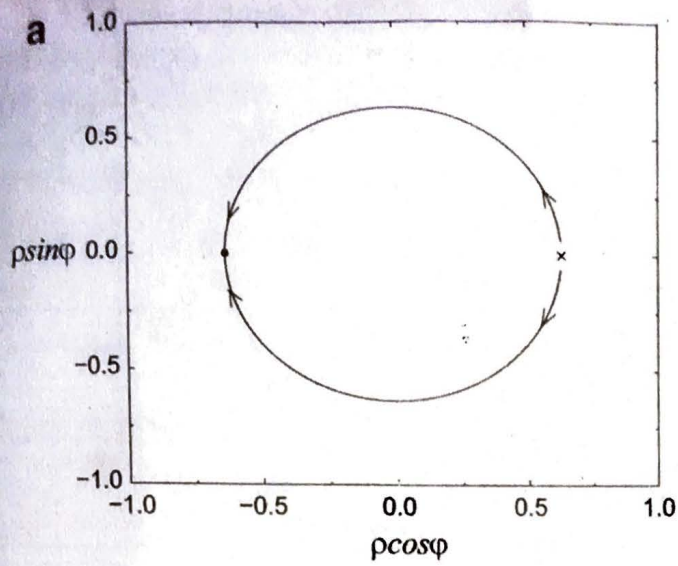


Fig. 4.3 $\Sigma = 0.1, \gamma = 0.01$

a: $\Delta = 0$ (sync)

b: $\Delta = 0.03$ (sync)

c: $\Delta = 0.032$ (no sync)

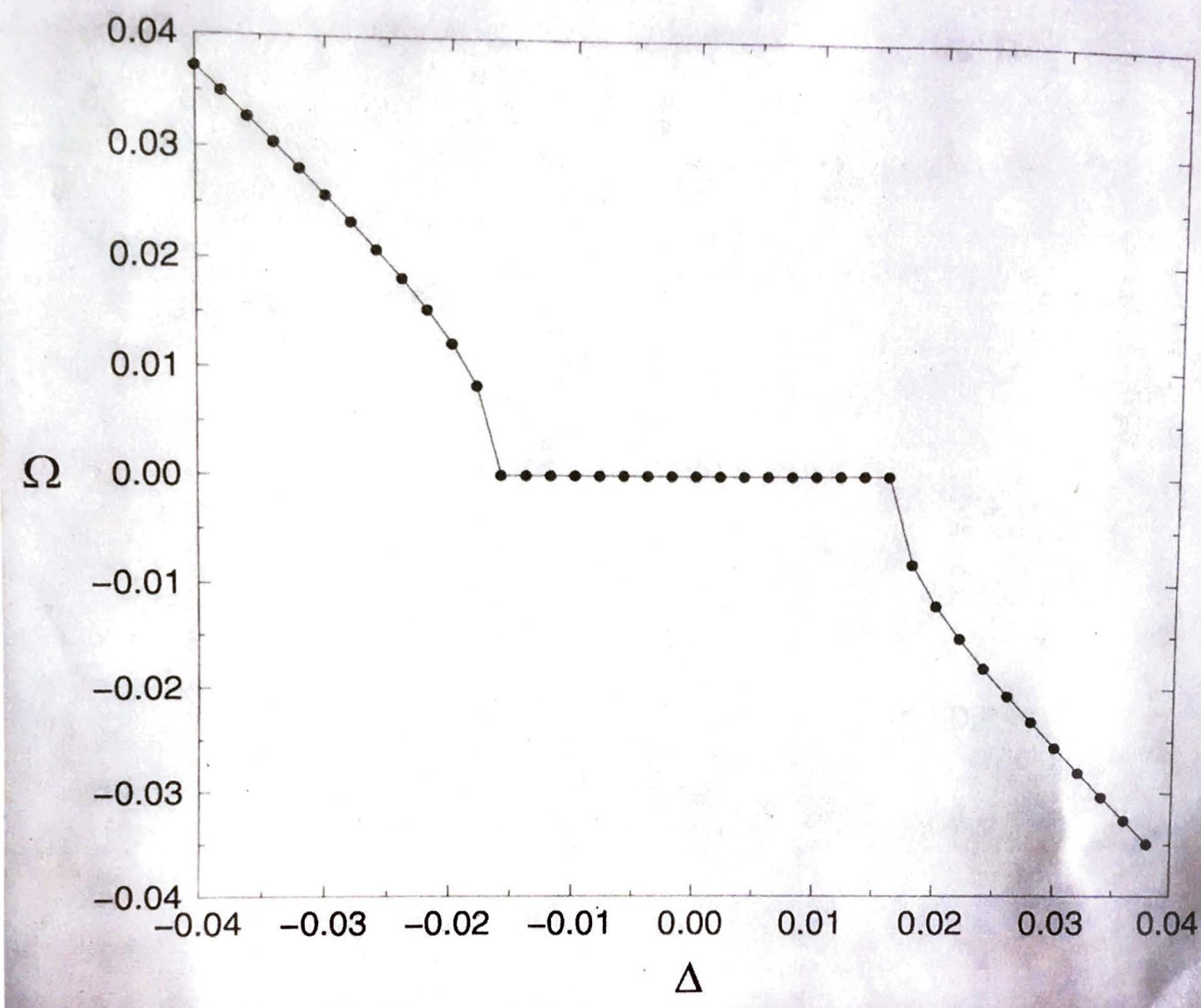


Fig. 4.4 Beat frequency $\Omega = \langle \dot{\varphi}(t) \rangle$
as function of freq. detuning Δ
for $\beta = 0.01$, $\varepsilon = 0.1$.

The freq. Ω is the difference
between the mean frequency of
self-sustained oscillations and freq.
of external force (beat freq.).

The interval of Δ where $\Omega = 0$
corresponds to sync. Outside
this region, there are beats with
frequency Ω .