- $\dot{q} = f[q,p]$
- $\dot{p} = g[q,p]$

- $\dot{q}[q_0,p_0] = f[q_0,p_0] = 0$
- $\dot{p}[q_0,p_0] = g[q_0,p_0] = 0$

$\Bigg\}$ $(p_0,q_0) :=$ punto fijo.

- $\delta\dot{q} = \frac{d}{dt}[\delta q] = \underbrace{\frac{\partial f}{\partial q}[q_0,p_0]}\,\delta q + \underbrace{\frac{\partial f}{\partial p}[q_0,p_0]}\,\delta p + \dots$

- $\delta\dot{p} = \frac{d}{dt}[\delta p] = \underbrace{\frac{\partial g}{\partial q}[q_0,p_0]}\,\delta q + \underbrace{\frac{\partial g}{\partial p}[q_0,p_0]}\,\delta p + \dots$

$$\longrightarrow \frac{d}{dt}\begin{bmatrix}\delta q\\ \delta p\end{bmatrix} = \underbrace{\begin{bmatrix}\frac{\partial f[q_0,p_0]}{\partial q} & \frac{\partial f[q_0,p_0]}{\partial p}\\ \frac{\partial g[q_0,p_0]}{\partial q} & \frac{\partial g[q_0,p_0]}{\partial p}\end{bmatrix}}_{M}\underbrace{\begin{bmatrix}\delta q\\ \delta p\end{bmatrix}}_{\bar{E}}$$

$$\Rightarrow \boxed{\frac{d\bar{E}}{dt} = M\bar{E}} \longrightarrow \boxed{\bar{E} = c_1\vec{D}_1 e^{\lambda_1 t} + c_2\vec{D}_2 e^{\lambda_2 t}}$$

- * $\vec{D}_i$ = autovectores
- * λ_i = autovalores.

(b)
- $x^{\circ} = 2x - y = 0 \Rightarrow y = 2x \Rightarrow \boxed{y = 0}$
- $y^{\circ} = x + 2y = 0 \Rightarrow x + 4x = 0 \Rightarrow \boxed{x = 0}$

$\Big\}$ puntos fijos.

- $x = 2xt - yt + x_0$
- $y = xt + 2yt + y_0$

$$\boxed{M = \begin{bmatrix}2 & -1\\ 1 & 2\end{bmatrix}}$$

- $x = -i c_1 e^{[2-i]t} + c_2[+i]e^{[2+i]t}$
- $y = c_2 e^{[2-i]t} + c_2 e^{[2+i]t}$

$\longrightarrow \vec{D}_1 = \begin{bmatrix}-i\\ 1\end{bmatrix}$; $\lambda_1 = 2-i$

$\longrightarrow \vec{D}_2 = \begin{bmatrix}i\\ 1\end{bmatrix}$; $\lambda_2 = 2+i$