



Clase 5:

Atractores caóticos



Atractores caóticos

- Motivación en el marco de la materia
- Vamos a ver en el Colab
- Atractor de Lorenz
- Atractor de Rossler
- Bibliografía

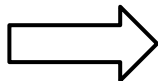
Motivación en el marco de la materia

- Sistemas dinámicos, autónomos, ODEs, N-dimensionales

$$\frac{d\vec{x}}{dt} = \vec{f}(t, \vec{x}) \quad \rightarrow \quad \text{campo vector}$$

- Resolvemos integrando numéricamente (problema del valor inicial)

$\vec{x}(t)$ \rightarrow soluciones \rightarrow trayectorias, diagrama de fases



`scipy.integrate.solve_ivp (RK45)`

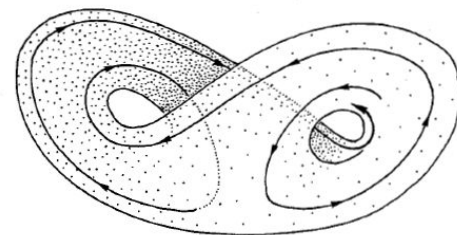
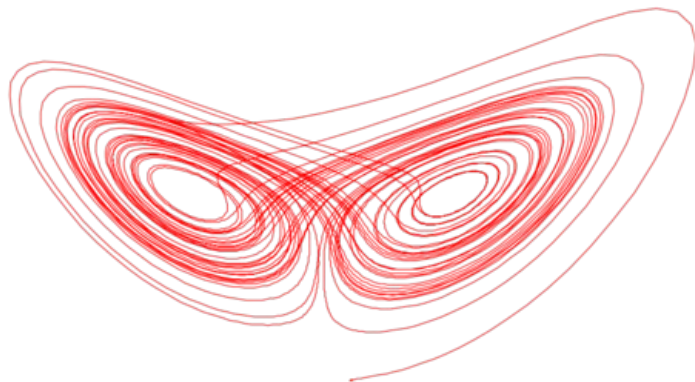
Vamos a hacer en el Colab



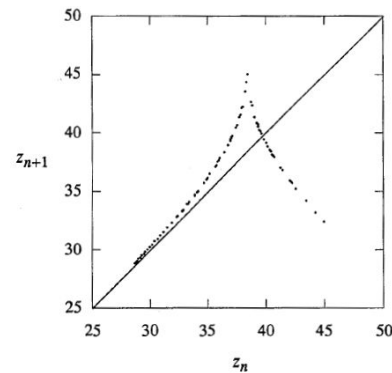
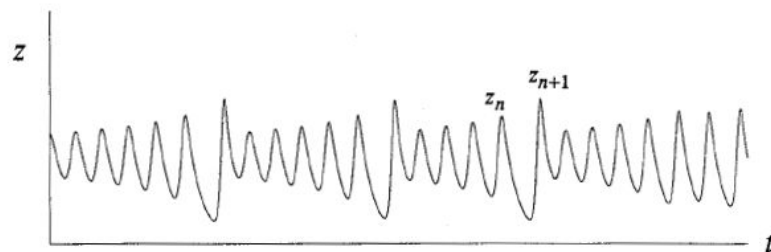
- Encontrar soluciones de atractores caóticos (Lorenz y Rossler)
- Diagramas de fase 3D
 - Animaciones 3D
- Mapas
- Sensibilidad con condiciones iniciales
 - Comparando soluciones

Atractor de Lorenz

$$\begin{aligned}\dot{x} &= \sigma(y - x) \\ \dot{y} &= rx - y - xz \\ \dot{z} &= xy - bz\end{aligned}$$

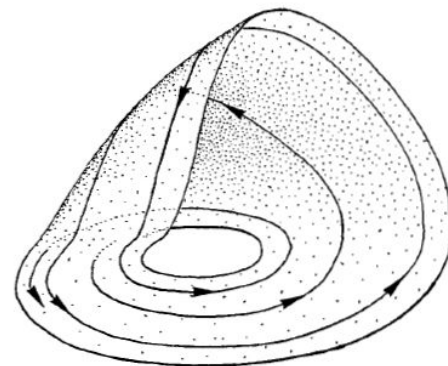
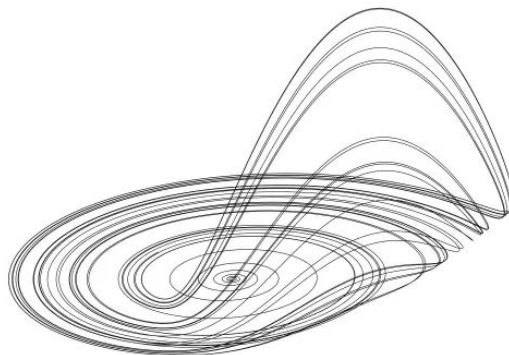


Mapas
discretos

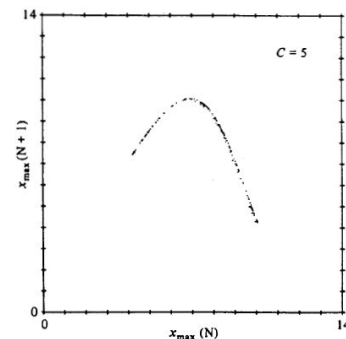
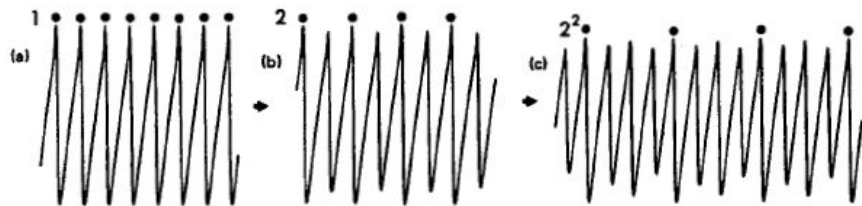


Atractor de Rossler

$$\begin{aligned}\dot{x} &= -y - z \\ \dot{y} &= x + ay \\ \dot{z} &= b + xz - cz\end{aligned}$$



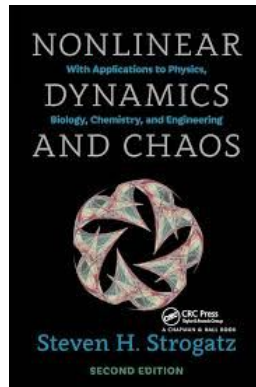
Mapas
discretos



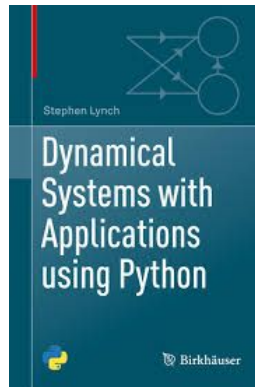
Bibliografía recomendada



Mindlin 2018



Strogatz 1994



Lynch 2018

