Chaotic Dynamical Systems

Contents

In this chapter we introduce the basic concepts of a dynamical system defined in the unit circle. We consider the following parametrization of the unit circle $\mathbb{S}^1 = \{e^{i\theta}\, \theta \in [0, 2\pi)\}$. The Arnold family is a two parameter family of homeomorphisms defined in the unit circle, given by

$$f_{\omega,\epsilon}(\theta) = \theta + 2\pi\omega + \epsilon \sin(\theta)$$

where ϵ and ω are parameters. The goal of this final part of the course is to understand the basic dynamics of an homeomorphism (or a diffeomorphism) of the circle. The contents of this part correspond to section 1.14 (Maps of the circle) of the first chapter of the reference book (*). You can visualize some examples of this family using the applet *The Arnold family* in the web page http://deim.urv.cat/ antonio.garijo.

- Lift of an homeomorphism f of the unit circle. Section 1.14 (Maps of the circle)

- Rotation number of an homeomorphism of the circle. Section 1.14 (Maps of the circle)

- The Arnold family. Section 1.14 (Maps of the circle)

Reference Book:(*) *An introduction to Chaotic Dynamical Systems.* R. L. Devaney. Addison-Wesley Studies in Nonlinearity. 1989.