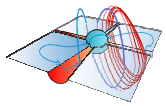
X Workshop on Dynamical Systems
São Carlos, July 1 to 4, 2019



A common and useful expression for all Poincaré half-maps in planar linear systems: construction via inverse integrating factors

Victoriano Carmona Centeno

Universidad de Sevilla

vcarmona@us.es

Abstract: The analysis of Poincaré half-maps in piecewise linear systems is usually based on the explicit integration of the flow in every linearity zone with the intention of obtaining a complete return map. This procedure causes two principal problems: the need to distinguish many cases depending on the spectra of the matrices and the nonlinear appearance of the flight time in the obtained expressions.
A way to override these two negative effects of the explicit integration is, obviously, to avoid this integration. Of course that if we do not integrate the system then we will not obtain explicit expressions for the orbits but, fortunately, the only important points of the orbit for Poincaré half maps are those that are located at the switching manifold, that is, the initial and final points of every piece of orbit. Therefore, the explicit expression of the orbit together with the flight time are completely irrelevant to the Poincaré half-map.
The question then is if there is any other way to get Poincaré half-maps without the explicit integration of the flow. The answer is yes and an alternative and fruitful way rest on inverse integrating factors.
In this talk we will explain how to use inverse integrating factors to obtain a common and useful expression to describe all Poincaré half-maps to straight lines for planar linear systems.
Joint work with Fernando Fernández-Sánchez and Elisabeth García-Medina.