

Minicourse

Integral characterization of Poincaré half-maps and its applications to limit cycles of planar piecewise linear systems

Fernando Fernandez

fefesan@us.es

Universidad de Sevilla, Spain

In this minicourse, we introduce a novel integral characterization of Poincaré half-maps for linear differential systems and explore its applications to various problems concerning the periodic behavior of planar piecewise linear systems. Key topics include the existence of a uniform upper bound for the maximum number of limit cycles in planar piecewise linear differential systems with two zones separated by a straight line—a problem that has remained unresolved for over 30 years since Lum-Chua’s seminal work, despite considerable research efforts. We also address the uniqueness and stability of limit cycles in these systems when there are no sliding regions, as well as characterize the existence of period annuli in systems with a straight line of non-smoothness. Additional applications and related open questions will also be discussed.
