

6–10 July, 2026, Santiago de Compostela, Spain.

On the Limit Cycles of Piecewise Differential Hamiltonian Systems

MARÍA P. ARMESTO, ROSANA RODRÍGUEZ-LÓPEZ

Abstract

Piecewise differential equations have numerous and diverse applications, with examples arising in contexts where a transition between two media with different characteristics occurs naturally. The first attempts to study piecewise differential systems consisted of replacing non-smooth dynamical systems with certain smooth approximations of them, easier to handle but neglecting the very effects produced by the non-smooth behaviour of the system.

While the solutions for piecewise differential systems have been thoroughly studied [2], some authors have focused their interest on the study of their limit cycles — or, at least, on estimating the maximum number of cycles the systems can hold. For two-dimensional flows, the simplest discontinuity curve proposed has been a straight line, but recently the study has extended to more general curves, such as conics [1]. In this contribution, we will present some results in this area of study, paying special attention to piecewise systems defined by Hamiltonian polynomial components.

References

- [1] J. Casimiro and J. Llibre, Limit cycles of discontinuous piecewise differential Hamiltonian systems separated by a circle, or a parabola, or a hyperbola, *Math. Comput. Simulation* **225** (2024), 303–312.
- [2] A. F. Filippov, *Differential Equations with Discontinuous Righthand Sides. Mathematics and its Applications, vol. 18*, Springer, Dordrecht, 1988.

María P. Armesto (contributor)
Departamento de Estadística, Análise Matemática e Optimización, Universidade de Santiago de Compostela,
Santiago de Compostela, Spain.
e-mail: maria.perez.armesto@rai.usc.es

Rosana Rodríguez-López (coauthor 2)
CITMAga, and Departamento de Estadística, Análise Matemática e Optimización, Universidade de Santiago de Compostela,
Santiago de Compostela, Spain.
e-mail: rosana.rodriguez.lopez@usc.es