

EFFECTIVE APPLICATIONS OF LYAPUNOV AND BENDIXSON-DULAC APPROACHES

ARMENGOL GASULL

Universitat Autònoma de Barcelona, Bellaterra, Catalonia, Spain
gasull@mat.uab.cat

In this talk I will present several new applications of the Lyapunov and Bendixson–Dulac approaches to study the number of limit cycles for several families of planar vector fields. Among other things I will obtain some results by using a function related with the curvature of the orbits of the vector field as a Dulac function; I will present a remarkable phenomenon: for each integer $m > 1$, I will provide a simple 1-parametric differential system for which we prove that it has limit cycles only for the values of the parameter is in a non empty subset of an interval which length decreases exponentially when m grows; I will study the existence of limit cycles for quadratic systems having some invariant algebraic curve.

It is based on the joint works with Hector Giacomini:

- Effectiveness of the Bendixson-Dulac theorem. *J. Differential Equations* **305** (2021) 347–367.
- Number of limit cycles for planar systems with invariant algebraic curves. *Preprint* (2022).