SYSTEMS AND EQUATIONS WITH FEW MONOMIALS AND THEIR LIMIT CYCLES

María Jesús Álvarez

Universitat de les Illes Balears, Palma de Mallorca, Spain
chus.alvarez@uib.es

In this talk we will deal with systems in the plane and equations in the cylinder with few monomials and their relationship with their number of limit cycles.

In the plane, on the one hand, it is well-known that systems written in a complex form with one monomial ($dz/dt = az^k\bar{z}^l, a \in \mathbb{C}$) can not have limit cycles. On the other hand, it was recently proved by Gasull-Li-Torregrosa that systems with three monomials can have an arbitrary number of limit cycles. In this talk we will fill the gap in between these two results and we will prove that systems with two monomials (independently of their degree) can have at most, one limit cycle. Moreover, we will characterize its existence.

In the cylinder, the situation is different. It is also well-known that equations with one monomial ($dx/dt = f(t)x^m$) can not have limit cycles, and it was proved by Lins-Neto that equations with two monomials can have an arbitrary number of limit cycles. Hence, there is no possibility of uniqueness of limit cycle depending on the number of monomials in the x variable. In order to characterize the uniqueness of limit cycle for equations with two monomials in the cylinder one has to impose conditions on their coefficients. In this talk, we will characterize the uniqueness of limit cycle for equations in the cylinder with two monomials in x and trigonometric monomials as coefficients.

This talk is based on two joint works, the first with A. Gasull and R. Prohens and the second with J.L Bravo, M. Fernández and R. Prohens.