Center problem and Hilbert’s 16th problem: tangential versions

Pavao Mardesic
Institut de Mathématiques, UFR Sciences et Techniques
Université de Bourgogne
9 Avenue Alain Savary—B.P. 47870
21078 Dijon Cedex
FRANCE
pavao.mardesic@u-bourgogne.fr

Abstract

Two classical problems on planar vector fields are:
1. the center problem and
2. the second part of Hilbert’s 16th problem concerning boundedness of the number of limit cycles.

An infinitesimal version of the above problems concerns small polynomial deformations of polynomial integrable vector fields in the plane. The problems amount to asking when the displacement function is identically zero and to the problem of the boundedness of the number of its isolated zeros respectively.

We consider here the first order or tangential versions of the above problems. For deformations of Hamiltonian vector fields this amounts to studying when Abelian integrals are identically zero or bounding their zeros.

We present some recent results with Christopher on the tangential center problem and some results with Bobienski and Novikov on the tangential 16th Hilbert problem.