New Family of Centers for Polynomial Vector fields of Arbitrary Degree

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Abstract

For all integer $n > 1$ we study the center variety of the 4–parameter family of real planar polynomial vector fields of degree n given, in complex notation, by $\dot{z} = iz + Az^n + B\bar{z}^n$, where $z = x + y\,i$ and $A, B \in \mathbb{C}$.

Key words: centers, polynomial vector fields, reversibility.

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1 Introduction

Poincaré in [7] defined the notion of a *center* for a vector field on the real plane; i.e. a singular point p for which there exists a neighborhood U such that $U \setminus \{p\}$ only contains closed orbits.

For planar polynomial vector fields an usual method to look for nondegenerate centers (i.e. having purely imaginary eigenvalues) is, first to translate the singular point candidate