

Global centers of the generalized polynomial Liénard differential systems

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Abstract

The global centers started to be studied seriously at the end of the XX century. In the last decades, the generalized polynomial Liénard differential systems have been studied intensively. In this paper we characterize all the generalized polynomial Liénard differential systems having a global center at the origin. In particular we provide the explicit expressions of all the generalized polynomial Liénard differential systems of degree 3 having a global center at the origin, and the explicit expression of a generalized polynomial Liénard differential system of degree 5 having a global center at the origin.

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1. Introduction and statement of the main results

We say that p is a *center* of a differential system in $\mathbb{R}^2$ if there exists a neighborhood U of p such that $U \setminus \{p\}$ is filled up with periodic orbits. The notion of center goes back to the works of Poincaré [12] and Dulac [5].

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