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Phase portraits of (2;0) reversible vector fields with symmetrical singularities

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ABSTRACT

In this paper we study the phase portraits in the Poincaré disk of the reversible vector fields of type (2;0) having generic bifurcations around a symmetric singular point p. We also prove the nonexistence of any periodic orbit surrounding p. We point out that some numerical computations were necessary in order to control the number of limit cycles.

1. Introduction and main results

Given two real C^k, $k \geqslant 1$, functions of two variables P, $Q : \mathbb{R}^2 \to \mathbb{R}$ we define a *planar C^k differential system* as a system of the form

$$\dot{x} = P(x, y), \qquad \dot{y} = Q(x, y), \tag{1}$$

where the dot in system (1) denotes the derivative with respect to the independent variable t. We call the map $X = (P, Q)$ a *vector field*. If P and Q are polynomials then system (1) is a *planar polynomial differential system*. In this case we say that system (1) has *degree n* if the maximum of the degrees of P and Q is n. If $n = 1$ then system (1) is called a *linear differential system*. This last class of systems is already completely understood (see for instance chapter 1 of [17]). However for $n \geq 2$, that is for nonlinear differential polynomial systems we know very few things. The class of planar polynomial systems with degree $n \geq 2$ is too wide, so is common to study more specific subclasses and to classify their topological phase portraits. See for instance [1], [10] and [23].

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