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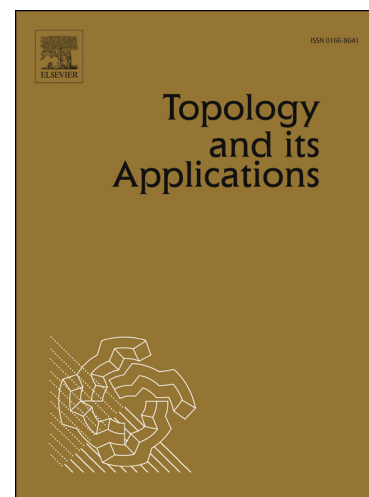
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Phase portraits for some symmetric Riccati cubic polynomial differential equations

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Abstract

We classify the topological phase portraits in the Poincaré disc of two classes of symmetric Riccati cubic polynomial differential systems .

Keywords: Riccati polynomial differential systems, vector fields, phase portrait, reversibility, equivariance.

2010 MSC: Primary 37J35, 37K10

1. Introduction and statement of the main results

The first works on Riccati equations appear in manuscripts of XVI-century by Count Riccati, who was mainly interested in studying the problem of separation of variables in quadratic and time-varying scalar systems, see [16]. Since then, in the subsequent centuries many contributions appeared regarding these equations. Nowadays it has been shown that Riccati differential equations appear in many applications such as in control, dynamic games, river flow, linear systems with Markovian jumps, invariant embedding, stochastic control theory, econometric models and diffusion problems (see for instance [2, 3, 4, 5, 7, 8, 9, 10, 11, 16, 17]).

A Riccati differential equation is of the form

$$\frac{dy}{dx} = A(x)y^2 + B(x)y + C(x),$$

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