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Qualitative Theory of Dynamical Systems

Quadratic Perturbations of a Quadratic Reversible Lotka–Volterra System

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Abstract We prove that perturbing the two periodic annuli of the quadratic polynomial reversible Lotka–Volterra differential system $\dot{x} = -y + x^2 - y^2$, $\dot{y} = x(1 + 2y)$, inside the class of all quadratic polynomial differential systems we can obtain the following configurations of limit cycles (0, 0), (1, 0), (2, 0), (1, 1) and (1, 2).

Keywords Quadratic vector field · Limit cycles · Isochronous center · Averaging theory

Mathematics Subject Classification (2000) Primary 34C07 · 34C08 · 37G15

1 Introduction

In this paper we consider the quadratic polynomial reversible Lotka–Volterra differential system (in the classification of quadratic centers given by Żołądek [9] and Iliev [3]):

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