

Limit Cycles for a Class of Continuous and Discontinuous Cubic Polynomial Differential Systems

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Abstract We study the maximum number of limit cycles that bifurcate from the periodic solutions of the family of isochronous cubic polynomial centers

$$\dot{x} = y(-1 + 2\alpha x + 2\beta x^2), \quad \dot{y} = x + \alpha(y^2 - x^2) + 2\beta xy^2, \quad \alpha \in \mathbb{R}, \beta < 0,$$

when it is perturbed inside the classes of all continuous and discontinuous cubic polynomial differential systems with two zones of discontinuity separated by a straight line. We obtain that this number is 3 for the perturbed continuous systems and at least 12 for the discontinuous ones using the averaging method of first order.

Keywords Polynomial vector field · Limit cycle · Averaging method · Periodic orbit · Isochronous center

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