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Limit cycles in 4-star-symmetric planar piecewise linear systems

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Abstract

Our interest is centered in the study of the number of limit cycles for nonsmooth piecewise linear vector fields on the plane when the switching curve is $xy = 0$. We consider the symmetric case. That is, one vector field defined in the odd quadrants and the other in the even ones. We deal with equilibrium points of center-focus type, with matrices in real Jordan form, in each vector field when the infinity is monodromic. In this case, we provide the center classification at infinity, we prove that the maximum order of a weak focus is five. Moreover, we show the existence of systems exhibiting five limit cycles bifurcating from infinity.

MSC: primary 34C25, 34C07, 37C27

Keywords: Non-smooth differential system; 4-cross-symmetric; Cyclicity; Limit cycles; Center-focus problem

1. Introduction

These last years a big interest appeared for studying nonsmooth piecewise differential systems, motivated mainly by their biological and engineering applications. In particular, piecewise

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