LIMIT CYCLES OF DISCONTINUOUS PIECEWISE DIFFERENTIAL SYSTEMS SEPARATED BY A STRAIGHT LINE AND FORMED BY TWO CUBIC REVERSIBLE ISOCHRONOUS CENTERS

JIE LI[1] AND JAUME LLIBRE[2]

Abstract. These last years an increasing interest appeared for studying the discontinuous piecewise differential systems motivated by the rich applications in modeling real phenomena. One of the difficulties for understanding the dynamics of these systems is the study their limit cycles. In this paper we study the limit cycles of the discontinuous piecewise differential systems separated by one straight line and formed by two distinct cubic reversible isochronous centers, whose first integrals are neither polynomial nor rational. The maximum number of limit cycles that this kind of discontinuous piecewise differential systems can have using the averaging theory up to seven order is ten.

1. Introduction and main results

Discontinuous piecewise differential systems formed by two linear differential systems separated by one straight line are some of the most remarkable non-smooth dynamical systems. These last years they have been intensively studied mainly due to their widely applications in various scientific domains of studies such as engineering, electronics, and physics, see for instance [2, 3, 9, 10, 15] and the references cited therein.

A limit cycle of a differential system is a periodic orbit isolated in the set of all periodic orbits of the differential system. Since 1930s some books discussed the study of the limit cycles of these discontinuous piecewise differential systems see for instance [1, 8, 16].

The next theorem is proved in section 12 of the paper [7].

[1]The corresponding author is Jie Li

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