



Limit cycles for some families of smooth and non-smooth planar systems



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ABSTRACT

We apply the averaging method in a class of planar systems given by a linear center perturbed by a sum of continuous homogeneous vector fields, to study lower bounds for their number of limit cycles. Our results can be applied to models where the smoothness is lost on the set $\Sigma = \{xy = 0\}$. They also motivate to consider a variant of Hilbert 16th problem, where the goal is to bound the number of limit cycles in terms of the number of monomials of a family of polynomial vector fields, instead of doing this in terms of their degrees.

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1. Introduction

A limit cycle is a periodic orbit of a differential system that is isolated in the set of all its periodic orbits. The investigation of the existence of limit cycles is relevant for its theoretical interest, because they are the α or ω limit set of many other trajectories, as well as for their importance in the study of many phenomena in applied sciences, see of instance [3,11,21,26,27]. One of the approaches to detect such objects is the averaging theory. We refer the books of Sanders and Verhulst [29] and Verhulst [31] for an introduction on this subject.

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