

Cyclicity of a Family of Vector Fields*

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We study the cyclicity and the center problem for a special family of planar differential equations. We also relate this cyclicity with the maximum number of limit cycles that bifurcate from a hamiltonian vector field. Afterwards we apply the result obtained to several known types of differential equations. © 1995 Academic Press, Inc.

1. INTRODUCTION

The center and cyclicity problems are only solved for some special kind of planar systems: quadratic differential equations, cubic differential equations with homogeneous nonlinearities, Liénard equations, and so on. In this paper we consider a family of differential equations with a center and prove that the addition of certain vector fields destroys the center. We also show that the cyclicity problem can be solved completely for this family. The main idea of our proof is inspired by [9]. We consider a system of generalized polar coordinates associated to the largest family of centers inside the family. The results obtained are applied to particular cases, some of them already studied in previous papers.

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