Limit cycles for rigid cubic systems ☆

A. Gasull [a], R. Prohens [b], J. Torregrosa [a,*]

[a] *Dept. de Matemàtiques, Universitat Autònoma de Barcelona, Edifici C 08193 Bellaterra, Barcelona, Spain*
[b] *Dept. de Matemàtiques i Informàtica, Escola Politècnica Superior, Universitat de les Illes Balears,*
07071 Palma de Mallorca, Spain

Abstract

We consider planar cubic systems with a unique rest point of center-focus type and constant angular velocity. For such systems we obtain an affine classification in three families, and, for two of them, their corresponding phase portraits on the Poincaré sphere. We also prove that for two of these families there is uniqueness of limit cycle. With respect the third family, we give the bifurcation diagram and phase portraits on the Poincaré sphere of a one-parameter sub-family exhibiting at least two limit cycles.
© 2004 Elsevier Inc. All rights reserved.

Keywords: Bifurcation; Limit cycle; Center; Cubic system

1. Introduction and main results

The study of the bifurcation diagram of a concrete family of planar vector exhibiting more than one limit cycle is usually a very difficult task. In this paper we consider a family of cubic systems. Our results seem to indicate that it presents at most two limit cycles, but