Phase portraits of separable quadratic systems and a bibliographical survey on quadratic systems

Tao Li[a], Jaume Llibre[b],*

[a] *Department of Mathematics, Sichuan University, 610064 Chengdu, Sichuan, PR China*

[b] *Departament de Matemàtiques, Universitat Autònoma de Barcelona, 08193 Bellaterra, Barcelona, Catalonia, Spain*

Abstract

Although planar quadratic differential systems and their applications have been studied in more than one thousand papers, we still have no complete understanding of these systems. In this paper we have two objectives.

First we provide a brief bibliographical survey on the main results about quadratic systems. Here we do not consider the applications of these systems to many areas as in Physics, Chemist, Economics, Biology, …

Second we characterize the new class of planar separable quadratic polynomial differential systems. For such class of systems we provide the normal forms which contain one parameter, and using the Poincaré compactification and the blow up technique, we prove that there exist 10 non-equivalent topological phase portraits in the Poincaré disc for the separable quadratic polynomial differential systems.
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* Corresponding author.
 E-mail addresses: t.l.scumath@gmail.com (T. Li), jllibre@mat.uab.cat (J. Llibre).