Qual. Theory Dyn. Syst. (2010) 9:89–99
DOI 10.1007/s12346-010-0021-x

Qualitative Theory of Dynamical Systems

A New Algorithm for Finding Rational First Integrals of Polynomial Vector Fields

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Received: 25 March 2009 / Accepted: 27 January 2010 / Published online: 5 August 2010
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Abstract We present a new method to compute rational first integrals of planar polynomial vector fields. The algorithm is in general much faster than the usual methods and also allows to compute the remarkable curves associated to the rational first integral of the system.

Keywords Polynomial vector field · Rational first integral · Remarkable curve

Mathematics Subject Classification (2000) 34C05 · 34A34 · 34C14

1 Introduction

A *polynomial vector field of degree m* defined on $\mathbb{C}^2$ is a vector field of the form

$$X(x, y) = P(x, y)\frac{\partial}{\partial x} + Q(x, y)\frac{\partial}{\partial y}, \tag{1.1}$$

A. Ferragut is partially supported by MTM2008-03437, 2009SGR410 and a MCI grant *Juan de la Cierva*.

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