Available online at www.sciencedirect.com

ScienceDirect

J. Differential Equations 258 (2015) 4348–4367

Journal of Differential Equations

www.elsevier.com/locate/jde

Divergence and Poincaré–Liapunov constants for analytic differential systems

Maite Grau [a,*], Jaume Llibre [b]

[a] Departament de Matemàtica, Universitat de Lleida, Avda. Jaume II, 69, 25001 Lleida, Catalonia, Spain
[b] Departament de Matemàtiques, Universitat Autònoma de Barcelona, 08193 Bellaterra, Barcelona, Catalonia, Spain

Received 1 September 2014; revised 9 December 2014

Available online 9 February 2015

Abstract

We consider a planar autonomous real analytic differential system with a monodromic singular point p. We deal with the center problem for the singular point p. Our aim is to highlight some relations between the divergence of the system and the Poincaré–Liapunov constants of p when these are defined.

MSC: 34C25; 37G10; 34A34; 34C05

Keywords: Center problem; Poincaré–Liapunov constants; Divergence; Hamiltonian

1. Introduction and statement of the main results

Let O be the origin of coordinates of $\mathbb{R}^2$ and let $\mathcal{U}_O$ be a neighborhood of O. We consider two real analytic functions $P(x, y)$ and $Q(x, y)$ in $\mathcal{U}_O$ which vanish at O. In this work we deal with the analytic differential systems of the form

$$\dot{x} = P(x, y), \qquad \dot{y} = Q(x, y), \tag{1}$$

where the dot denotes derivative with respect to an independent real variable t.

* Corresponding author.
E-mail addresses: mtgrau@matematica.udl.cat (M. Grau), jllibre@mat.uab.cat (J. Llibre).

http://dx.doi.org/10.1016/j.jde.2015.01.035
0022-0396/