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J. Differential Equations 268 (2020) 4416-4422

Journal of Differential Equations

www.elsevier.com/locate/jde

Bounded polynomial vector fields in \mathbb{R}^2 and \mathbb{R}^n

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> Received 8 February 2019; accepted 21 October 2019 Available online 28 October 2019

Abstract

We characterize the bounded polynomial vector fields in \mathbb{R}^2 . Additionally we provide a necessary condition but not sufficient which must be satisfied by bounded polynomial vector fields in \mathbb{R}^n . © 2019 Elsevier Inc. All rights reserved.

MSC: primary 34D09, 37D25, 47D06

Keywords: Bounded polynomial vector fields; Topological index; Poincaré compactification

1. Introduction

Many interesting problems coming from the physical and natural sciences can be modeled by polynomial vector fields in \mathbb{R}^2 as for instance the Lotka–Volterra systems, the Blausius equation, the van der Pol equation, ... [6]. But the polynomial vector fields started to be analyzed from a mathematical point of view in the works of Poincaré [15], Hilbert [11], Bendixson [1], Dulac [8], ... Since the general class of polynomial vector fields in \mathbb{R}^2 is very difficult to study, many authors put their attention to several subclasses. Here our main objective is to characterize the class of bounded polynomial vector fields in \mathbb{R}^2 .

Bounded polynomial vector fields already have been studied by several authors. Thus the bounded quadratic vector fields have been studied by Coll, Dickson, Dumortier, Gasull, Herssens,

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https://doi.org/10.1016/j.jde.2019.10.023

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