



Qualitative Theory of Planar Differential Systems [

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Monografía

The book deals essentially with systems of polynomial autonomous ordinary differential equations in two real variables. The emphasis is mainly qualitative, although attention is also given to more algebraic aspects as a thorough study of the center/focus problem and recent results on integrability. In the last two chapters the performant software tool P4 is introduced: based on both algebraic manipulation and numerical calculation, this was conceived for the purpose of drawing "Polynomial Planar Phase Portraits" on part of the plane, or on a Poincaré compactification, or even on a Poincaré-Lyapunov compactification of the plane. From the start, differential systems are represented by vector fields enabling, in full strength, a dynamical systems approach. All essential notions, including invariant manifolds, normal forms, desingularization of singularities, index theory and limit cycles, are introduced and the main results are proved for smooth systems with the necessary specifications for analytic and polynomial systems. The book is very appropriate for a first course in dynamical systems, presenting the basic notions in the study of individual two dimensional systems. Not only does it provide simple and appropriate proofs, but it also contains a lot of exercises and presents a survey of interesting results with the necessary references to the literature

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Contenido: Basic Results on the Qualitative Theory of Differential Equations -- Normal Forms and Elementary Singularities -- Desingularization of Nonelementary Singularities -- Centers and Lyapunov Constants -- Poincaré and Poincaré-Lyapunov Compactification -- Indices of Planar Singular Points -- Limit Cycles and Structural Stability -- Integrability and Algebraic Solutions in Polynomial Vector Fields -- Polynomial Planar Phase Portraits -- Examples for Running P4

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