1. Record Nr. UNINA9910808484203321

Autore	Ginoux Jean-Marc
Titolo	Differential geometry applied to dynamical systems / / Jean-Marc Ginoux
Pubbl/distr/stampa	New Jersey, : World Scientific, c2009
ISBN	1-282-44268-6 9786612442681 981-4277-15-0
Edizione	[1st ed.]
Descrizione fisica	1 online resource (341 p.)
Collana	World Scientific series on nonlinear science. Series A, Monographs and treatises, , 1793-1010 ; ; v. 66
Disciplina	519
Soggetti	Dynamics Geometry, Differential
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Preface; Acknowledgments; Contents; List of Figures; List of Examples; Dynamical Systems; 1. Differential Equations; 1.1 Galileo's pendulum; 1.2 D'Alembert transformation; 1.3 From differential equations to dynamical systems; 2. Dynamical Systems; 2.1 State space - phase space; 2.2 Definition; 2.3 Existence and uniqueness; 2.4 Flow, fixed points and null-clines; 2.5 Stability theorems; 2.5.1 Linearized system; 2.5.2 Hartman-Grobman linearization theorem; 2.5.3 Liapouno. stability theorem; 2.6 Phase portraits of dynamical systems; 2.6.1 Two-dimensional systems; 2.6.2 Three-dimensional systems 2.7 Various types of dynamical systems2.7.1 Linear and nonlinear dynamical systems; 2.7.2 Homogeneous dynamical systems; 2.7.3 Polynomial dynamical systems; 2.7.4 Singularly perturbed systems; 2.7.5 Slow-Fast dynamical systems; 2.8 Two-dimensional dynamical systems; 2.8.1 Poincare index; 2.8.2 Poincare contact theory; 2.8.3 Poincare limit cycle; 2.8.4 Poincare-Bendixson Theorem; 2.9 High-dimensional dynamical systems; 2.9.1 Attractors; 2.9.2 Strange attractors; 2.9.3 First integrals and Lie derivative; 2.10 Hamiltonian and integrable systems; 2.10.1 Hamiltonian dynamical systems 2.10.2 Integrable system2.10.3 K.A.M. Theorem; 3. Invariant Sets; 3.1 Manifold; 3.1.1 Definition; 3.1.2 Existence; 3.2 Invariant sets; 3.2.1

Sommario/riassunto

This book aims to present a new approach called Flow Curvature Method that applies Differential Geometry to Dynamical Systems. Hence, for a trajectory curve, an integral of any n-dimensional dynamical system as a curve in Euclidean n-space, the curvature of the trajectory - or the flow - may be analytically computed. Then, the location of the points where the curvature of the flow vanishes defines a manifold called flow curvature manifold. Such a manifold being defined from the time derivatives of the velocity vector field, contains information about the dynamics of the system, hence identifyi