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2.10.2 Integrable system 2.10.3 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 Global invariance; 3.2.2 Local invariance; 4. Local Bifurcations; 4.1 Center Manifold Theorem; 4.1.1 Center manifold theorem for flows; 4.1.2 Center manifold approximation; 4.1.3 Center manifold depending upon a parameter; 4.2 Normal Form Theorem.; 4.3 Local Bifurcations of Codimension 1; 4.3.1 Saddle-node bifurcation; 4.3.2 Transcritical bifurcation; 4.3.3 Pitchfork bifurcation; 4.3.4 Hopf bifurcation; 5. Slow-Fast Dynamical Systems; 5.1 Introduction 5.2 Geometric Singular Perturbation Theory 5.2.1 Assumptions; 5.2.2 Invariance; 5.2.3 Slow invariant manifold; 5.3 Slow-fast dynamical systems - Singularly perturbed systems; 5.3.1 Singularly perturbed systems; 5.3.2 Slow-fast autonomous dynamical systems; 6. Integrability; 6.1 Integrability conditions, integrating factor, multiplier; 6.1.1 Two-dimensional dynamical systems; 6.1.2 Three-dimensional dynamical systems; 6.2 First integrals - Jacobi's last multiplier theorem; 6.2.1 First integrals; 6.2.2 Jacobi's last multiplier theorem; 6.3 Darboux theory of integrability 6.3.1 Algebraic particular integral - General integral 6.3.2 General integral; 6.3.3 Multiplier; 6.3.4 Algebraic particular integral and fixed points; 6.3.5 Homogeneous polynomial dynamical systems of degree  $m$ ; 6.3.6 Homogeneous polynomial dynamical systems of degree two; 6.3.7 Planar polynomial dynamical systems; Differential Geometry; 7. Differential Geometry; 7.1 Concept of curves - Kinematics vector functions; 7.1.1 Trajectory curve; 7.1.2 Instantaneous velocity vector; 7.1.3 Instantaneous acceleration vector; 7.2 Gram-Schmidt process - Generalized Frenet moving frame 7.2.1 Gram-Schmidt process

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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 identify

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