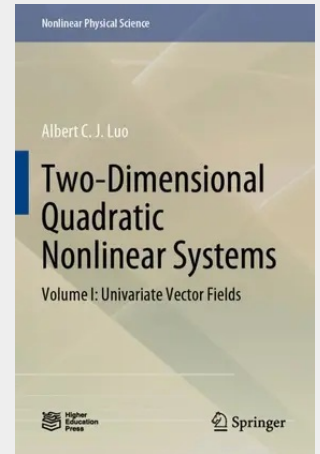


Two-Dimensional Quadratic Nonlinear Systems

Volume I: Univariate Vector Fields

This book focuses on the nonlinear dynamics based on the vector fields with univariate quadratic functions. This book is a unique monograph for two-dimensional quadratic nonlinear systems. It provides different points of view about nonlinear dynamics and bifurcations of the quadratic dynamical systems. Such a two-dimensional dynamical system is one of simplest dynamical systems in nonlinear dynamics, but the local and global structures of equilibriums and flows in such two-dimensional quadratic systems help us understand other nonlinear dynamical systems, which is also a crucial step toward solving the Hilbert's sixteenth problem. Possible singular dynamics of the two-dimensional quadratic systems are discussed in detail. The dynamics of equilibriums and one-dimensional flows in two-dimensional systems are presented. Saddle-sink and saddle-source bifurcations are discussed, and saddle-center bifurcations are presented. The infinite-equilibrium states are switching bifurcations for nonlinear systems. From the first integral manifolds, the saddle-center networks are developed, and the networks of saddles, source, and sink are also presented. This book serves as a reference book on dynamical systems and control for researchers, students, and engineering in mathematics, mechanical, and electrical engineering.

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