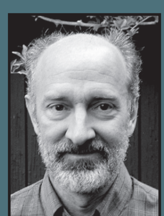
Differential equations are the basis for models of any physical systems that exhibit smooth change. This book combines much of the material found in a traditional course on ordinary differential equations with an introduction to the more modern theory of dynamical systems. Applications of this theory to physics, biology, chemistry, and engineering are shown through examples in such areas as population modeling, fluid dynamics, electronics, and mechanics.

Differential Dynamical Systems, Revised Reprint begins with coverage of linear systems, including matrix algebra; the focus then shifts to foundational material on nonlinear differential equations, making heavy use of the contraction-mapping theorem. Subsequent chapters deal specifically with dynamical systems concepts—flow, stability, invariant manifolds, the phase plane, bifurcation, chaos, and Hamiltonian dynamics. Revisions include simplified and clarified proofs of a number of theorems, an expanded introduction to function spaces, additional exercises, and the correction of typographical errors.

Throughout the book, the author includes exercises to help students develop an analytical and geometrical understanding of dynamics. Many of the exercises and examples are based on applications and some involve computation; an appendix offers simple codes written in Maple®, Mathematica®, and MATLAB® software to give students practice with computation applied to dynamical systems problems.

This textbook is intended for senior undergraduates and first-year graduate students in pure and applied mathematics, engineering, and the physical sciences. Readers should be comfortable with elementary differential equations and linear algebra and should have had exposure to advanced calculus.



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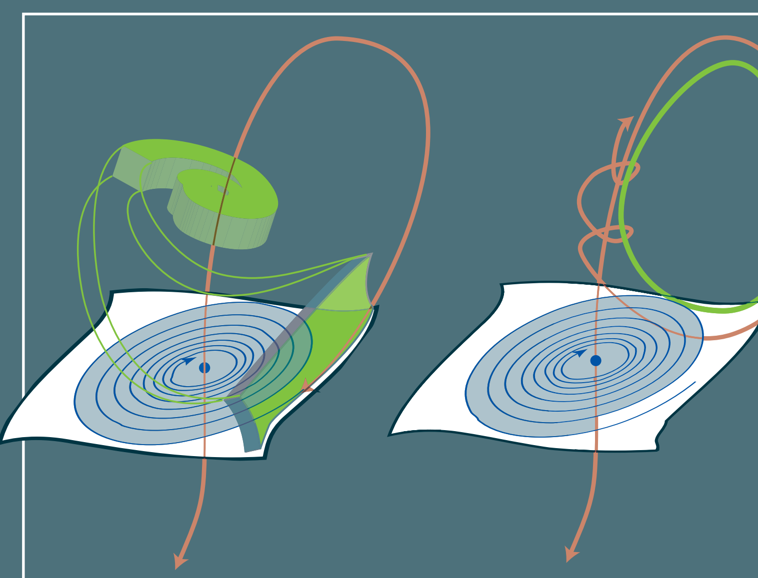

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