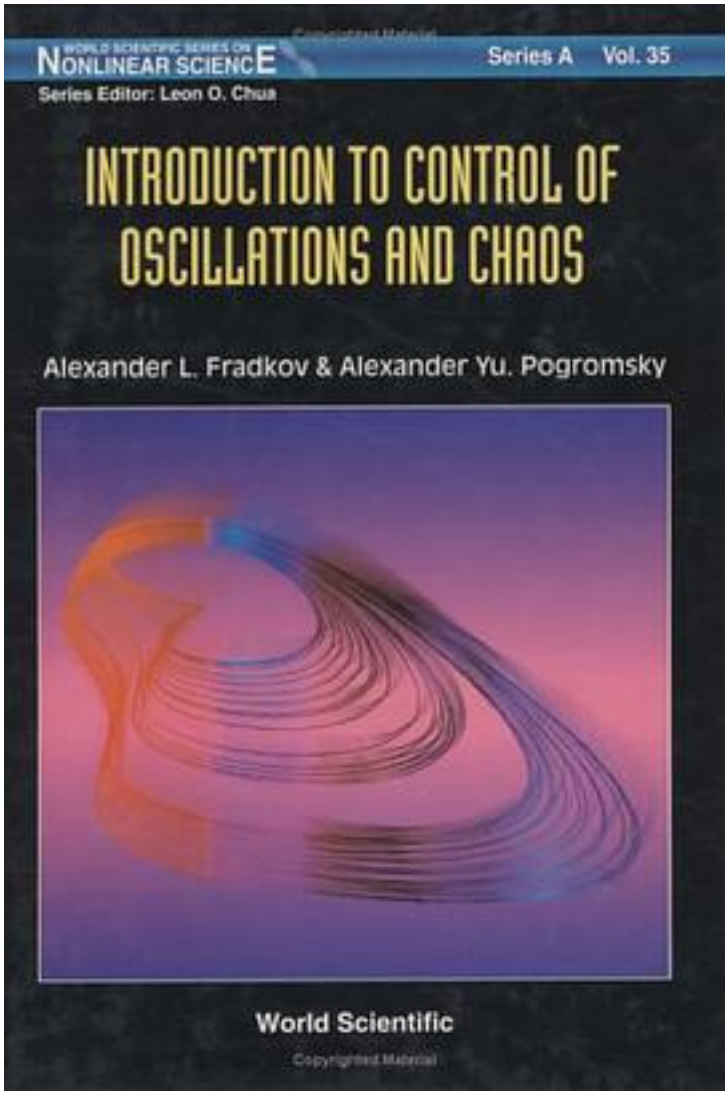
Introduction to Control of Oscillations and Chaos



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An exposition of the field of control of oscillatory and chaotic systems, which has numerous potential applications in mechanics, laser and chemical technologies, communications, biology and medicine, economics and ecology. A novelty of the book is its systematic application of modern nonlinear and adaptive control theory to the new class of problems. The proposed control design methods are based on the concepts of Lyapunov functions, Poincare maps, speed-gradient and gradient algorithms. The conditions which ensure such control goals as an excitation or suppression of oscillations, synchronization and transformation from chaotic mode to the periodic one or vice versa, are established. The performance and robustness of control systems under disturbances and uncertainties are evaluated. The described methods and algorithms are illustrated by a number of examples, including classical models of oscillatory and chaotic systems: coupled pendula, brusselator, Lorenz, Van der Pol, Duffing, Henon and Chua systems. Practical examples from different fields of science and technology such as communications, growth of thin films, synchronization of chaotic generators based on tunnel diods, stabilization of swings in power systems, and the increasing predictability of business-cycles are also presented. The book also includes many results on nonlinear and adaptive control published previously in Russian.

作者介绍:

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