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Book Review: *Introduction to Nonlinear Dynamics for Physicists*

Introduction to Nonlinear Dynamics for Physicists, D. I. Abarbanel, M. I. Rabinovich, and M. M. Suschik, World Scientific, Singapore, 1993.

No more than a dozen years ago the cry, "The Russians are coming!" suggested a threat. These days it means that Russian scientists are coming as active collaborators of their colleagues at universities in the western hemisphere. The book under review consists of notes for a course given by the well-known Russian scientist Mikhael Rabinovich in the Physics Department of the University of California-San Diego.

As to the contents, the book begins with a description of nonlinear oscillators with zero, linear, negative, and nonlinear dissipation. In analyzing the last of these (the van der Pol oscillator) the authors make use of amplitude equations, Poincaré maps, and a division into fast and slow variables. The synchronization and competition between modes are considered in some detail. A second group of problems relates to different types of bifurcations and resonant interactions between oscillators. These concepts are illustrated in the context of physical phenomena such as shock waves, weak turbulence, and Rayleigh–Benard convection. Finally, all three scenarios for the onset of deterministic chaos are described, in addition to several quantitative characteristics of chaos. The book concludes with a set of problems without solutions.

As the authors acknowledge in the Preface, the book consists of unpolished lecture notes. This has the advantage of allowing the appeal to handwaving mathematical techniques and not quite artistic, crudely drawn figures. There are also the balancing disadvantages of superficiality, misprints, and the lack of references that might have permitted an interested reader to steer through the literature of chaos.

The book might have some use as lecture notes for teachers at

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different levels of sophistication, but I would suggest to a wider audience that they wait for the appearance of the new, more comprehensive edition promised by the authors in the Preface.

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