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Book Review: *Order within Chaos*

Order within Chaos. P. Berge, Y. Pomeau, and C. Vidal, Wiley, New York, 1984.

Nowadays nobody is surprised by an intimate relationship between the two words that appear in the title of this book, whereas only a few dozen years ago, chaos was considered as the opposite of order. One can say that we have come back to our sources. In fact, the Bible opens with God's creation of the Earth and the Heavens from "waste and void," which seems to be a wrong translation of the Hebrew, "Tohu ve Vohu," which means literally "chaos."

The "new" discovery has changed all our ideas of determinism and randomnees. The latter does not require external or internal noise: a deterministic system with even a few degrees of freedom behaves "chaotically" by itself, and only subtle criteria differentiate between deterministic chaos and "true" random chaos. Even L. Landau with his exceptional physical intuition thought that only systems with a large ("infinite") number of degrees of freedom can display chaotic behavior.

The extensive introduction to this book contains a description of all types of oscillators, the main methods of their analysis (Fourier transform and Poincaré sections), and some applications (the compass rotation, convection, and the Zhabotinsky chemical reaction).

In the main part of the book, the authors describe the basic properties of strange attractors in disssipative systems, considering as examples the Lorenz, Henon, and horseshoe attractors, as well as the three main scenarios of transition from periodicity to stange-attractor behavior (quasiperiodicity, subharmonic cascades, and intermittency).

This book is written by physicists for physicists. It contains many scientific (physical, chemical, and biological) applications, deliberately avoiding mathematical theorems and lemmas. The book contains many carefully selected, very well-explained illustrations, which provide, in fact, a scientific course in pictures.

The pedagogical style of the book leads to some shortcomings. Although the book looks to the future (the subtitle is called "towards a

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deterministic approach to turbulence"), it seems to be too "canonical," not sufficiently emphasizing unsolved problems and not testing thereby the independent thinking of the reader. A set of problems could probably make up this deficiency.

Overall, this book is very useful as an introductory course for students and beginning "chaotists."

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