Book Review

Chaos and Nonlinear Dynamics: An Introduction for Scientists and Engineers, by Robert C. Hilborn. Published by Oxford University Press, New York, 1994, 654 pp.

Chaos is a relatively new area of nonlinear dynamics that has only received attention in the last 10–15 years. The study of chaos was originally limited to mathematicians. In recent years, a great number of scientists and engineers have become interested in chaos because of the unique opportunities it presents. On the surface chaotic behavior appears to be almost random, but in reality chaos is deterministic. Knowledge of the initial conditions of a chaotic system allows one to predict its future behavior. Because *a priori* knowledge of the initial conditions is rare, practical applications have been slow in coming. But chaos is now beginning to find applications in controls, secure communications, and lasers. One of the shortcomings in the study of chaos has been the lack of a good "primer" for new scientists and engineers entering this field of study. To date, most texts on chaos require some prior knowledge of nonlinear dynamics.

This text provides an excellent source for any scientist or engineer wanting to learn about chaos. It begins with basic descriptions and examples of chaos and nonlinear dynamics and is written for technical people with little or no prior knowledge of nonlinear dynamics. Those who already have a basic knowledge of nonlinear dynamics may only wish to review the first several chapters. Rather than presenting complex definitions at the beginning of the text, the author "builds" the definitions, starting with basic concepts and then adding to those until the more rigorous definition is achieved. Once the basic definitions and examples are complete, a more detailed investigation of the various aspects and underlying mathematics involved in chaos are described. The various conditions under which chaos can occur and how those chaotic systems can be identified and quantified are presented. Throughout the text, challenging exercises are included that give the scientist or engineer the foundation needed to comprehend chaotic systems. The only shortcoming to these problems is the lack of solutions for them.

In summary, this book is well thought-out and written. It is easy for an entry level engineer or scientist to read and comprehend the concepts presented. This book fills a hole that has existed in chaos books by allowing a classroom level study of chaos and nonlinear dynamics. Those who are already knowledgeable about chaos will find this book rudimentary. I have already recommended this text to several colleagues who are interested in learning about chaos and nonlinear dynamics. On the whole, this is an excellent book and will be useful for both self-study and classroom study.

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