Book Review

Chaotic and Fractal Dynamics: An Introduction for Applied Scientists and Engineers, by Francis C. Moon. Published by Wiley–Interscience, New York, 1992, 508 pp.

When I was asked to prepare an introductory course on chaos for engineering students at the University of Alabama in Huntsville (UAH) in 1991, I reviewed all the textbooks and monograms available at the time. From my review, I concluded that Moon's early book, *Chaotic Vibrations*, was the best available book for this introductory course. However, because this earlier book had no problem sets, I found it difficult to use as a text. Therefore, I was very happy to see the addition of problem sets to his new book. The only criticism I have is that the author should add some analytical problems that help lead the student into understanding both the physics and mathematics of nonlinear dynamics. While the geometric, calculator, and computer problems that Moon has introduced into the present book are well done, I have found over the years that students tend to get more involved in working with the computer or the calculator rather than learning the physics or engineering. In addition, I would also recommend some worked examples and an appendix with the solutions/answers to part or all of the problems. I have found that the solution/answer appendix to be a valuable aid to the student and the instructor.

I particularly like his extensive bibliography, although I do believe that he needs to recognize some of the contributions made by foreign authors, especially those in the former Soviet Union who have made many valuable contributions to the science of nonlinear dynamics. In the literature I found several excellent examples of the application of nonlinear dynamics to the design of particle accelerators, microwave tubes, lasers, electronics, and so forth.

Besides the excellent job he does in relating nonlinear dynamics to real engineering problems, I believe that his greatest contributions are his appendices. Because chaos is a young science, relatively speaking, and has a language of its own, the glossary of terms in Appendix A is extremely valuable to the novice. Appendices B and C give the student the opportunity to actually observe chaotic behavior and aid in his/her understanding of the abstract concepts presented in the text. However, to make the book self-contained, I do believe that it would help to include some examples of computer codes that would allow the student to run some experiments at her/his leisure without having to spend considerable time trying to develop computer code.

If I taught an introductory course in chaos, I would probably use Moon's book in conjunction with the excellent book by Robert C. Hilborn, *Chaos and Nonlinear Dynamics: An Introduction for Scientists and Engineers*. I would use Hilborn's book to teach the fundamentals, and Moon's book to relate the concepts of nonlinear dynamics to engineering problems. In summary, I believe Moon's book to be one of the best books on the subject of chaos and nonlinear dynamics on the market today. I have already recommended this book to many colleagues interested in learning the science of chaos, as well as to various universities for use in engineering and science courses.

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