



Chaotic Vibrations: An Introduction for Applied Scientists and Engineers

By Francis C. Moon

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Translates new mathematical ideas in nonlinear dynamics and chaos into a language that engineers and scientists can understand, and gives specific examples and applications of chaotic dynamics in the physical world. Also describes how to perform both computer and physical experiments in chaotic dynamics. Topics cover Poincare maps, fractal dimensions and Lyapunov exponents, illustrating their use in specific physical examples. Includes an extensive guide to the literature, especially that relating to more mathematically oriented works; a glossary of chaotic dynamics terms; a list of computer experiments; and details for a demonstration experiment on chaotic vibrations.

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Editorial Review

From the Back Cover

The book that brings order to chaos

Fifteen years ago, Francis Moon's *Chaotic Vibrations* introduced, in practical language, the new ideas of nonlinear dynamics and chaos. Since then, the field has grown tremendously, and "chaos" has entered the vocabulary of not only physicists and mathematicians but also the general public. Researchers in nonlinear dynamics have broadened their scope to investigate ideas of complexity in natural and human-made systems, including networks in the brain, electric energy grids, and the Internet.

With this paperback reissue of Professor Moon's classic, we hope to interest a new generation of readers intrigued by unpredictability in the laws of physics and its manifestation in the physical world in the form of chaotic dynamics.

Written for engineers and applied scientists, *Chaotic Vibrations* gives specific examples and applications of chaotic dynamics in the physical world. It also describes how to perform both computer and physical experiments in chaotic dynamics. Topics covered include:

- * Poincaré maps
- * Fractal dimensions
- * Lyapunov exponents
- * Experiments in chaos
- * Chaos in engineering

Similar in its broad scope to James Gleick's *Chaos*, only geared to a more technically curious reader, *Chaotic Vibrations* features an extensive guide to the literature, especially as it relates to more mathematically-oriented works; a glossary of nonlinear dynamics terms; a list of computer experiments; and details for a demonstration experiment on chaotic vibrations. This handy paperback version of *Chaotic Vibrations* arms engineers and researchers with the new tools of dynamical systems and prepares them to make their own contributions to this exciting and rapidly developing field.

About the Author

FRANCIS C. MOON, PhD. Before returning to Cornell in 1975, Professor Moon taught at Princeton University. At Cornell, he spent seven years as chair of the Department of Theoretical and Applied Mechanics and then served as director of the Sibley School of Mechanical and Aerospace Engineering from 1987-1992. He has published nearly 150 technical papers and five books, spanning a wide spectrum of problems in nonlinear dynamics and chaos, dynamics of structures, magneto-mechanical systems, superconducting bearings, magnetic levitation of vehicles, smart structures, and most recently, the history of engineering. Professor Moon is a member of the National Academy of Engineering.

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