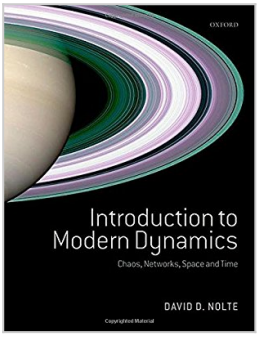

Introduction to Modern Dynamics: Chaos, Networks, Space and Time

By David D. Nolte

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The best parts of physics are the last topics that our students ever see. These are the exciting new frontiers of nonlinear and complex systems that are at the forefront of university research and are the basis of many high-tech businesses. Topics such as traffic on the World Wide Web, the spread of epidemics through globally-mobile populations, or the synchronization of global economies are governed by universal principles just as profound as Newton's laws. Nonetheless, the conventional university physics curriculum reserves most of these topics for advanced graduate study. Two justifications are given for this situation: first, that the mathematical tools needed to understand these topics are beyond the skill set of undergraduate students, and second, that these are speciality topics with no common theme and little overlap.

Introduction to Modern Dynamics dispels these myths. The structure of this book combines the three main topics of modern dynamics - chaos theory, dynamics on complex networks, and general relativity - into a coherent framework. By taking a geometric view of physics, concentrating on the time evolution of physical systems as trajectories through abstract spaces, these topics share a common and simple mathematical language through which any student can gain a unified physical intuition. Given the growing importance of complex dynamical systems in many areas of science and technology, this text provides students with an up-to-date foundation for their future careers.

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Editorial Review

Review
In Introduction to Modern Dynamics, David D. Nolte ... provides us with a textbook for an alternative, and in many ways a more up-to-date, version of the classical mechanics course. Robert C. Hilborn, American Journal of Physics Introduction to Modern Dynamics strikes me as two books in one: a beginning graduate-level modern analyticalmechanics text emphasizing geometric techniques and a survey for advanced undergraduates of some current topics in the dynamics of complex systems. The bifurcation is an understandable consequence of the need to accommodate the perhaps outdated dictates of the traditional advanced undergraduate mechanics course. Noltes book is a bold attempt toward updating and energizing the physics curriculum. David Feldman, Physics Today Physicists in the twenty-first century will surely be called upon to address the many complex problems facing society using methods formulated in the nineteenth-century but enhanced by the powerful computers that are now ubiquitous. This book lays the groundwork for that undertaking and covers topics that should be part of the training of every undergraduate physics major Julien Clinton Sprott, author of Chaos and Time-Series Analysis

About the Author

David D. Nolte, *Professor of Physics, Purdue University*

David D. Nolte is a Professor of Physics at Purdue University and is an internationally recognized researcher in laser photonics. He received his baccalaureate from Cornell University and his PhD from the University of California at Berkeley. He is the author of over 160 journal papers, has secured 14 US patents in applied optics and biophotonics, and is the technical founder of two small start-up companies: Perfinity, Inc., a molecular diagnostics company, and Animated Dynamics LLC, a cancer therapeutics company, both located in West Lafayette, IN.

David is a Fellow of the Optical Society of America, a Fellow of the American Physical Society and a Fellow of the American Association for the Advancement of Science. He was a Research Fellow of the Alfred P. Sloan Foundation, and a Presidential Young Investigator of the National Science Foundation. In 2005 he received the Herbert Newby McCoy Award, which is the highest scientific honor awarded by Purdue University.

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