



Richard H. Enns
George C. McGuire

NONLINEAR PHYSICS

with Maple
*for Scientists
and Engineers*

B I R K H Ä U S E R

Nonlinear Physics With Maple Files And Experiments

Richard Enns, George McGuire



Nonlinear Physics With Maple Files And Experiments:

Nonlinear Physics with Maple for Scientists and Engineers Richard H. Enns, George C. McGuire, 2012-12-06 Philosophy of the Text This text presents an introductory survey of the basic concepts and applied mathematical methods of nonlinear science as well as an introduction to some simple related nonlinear experimental activities Students in engineering physics chemistry mathematics computing science and biology should be able to successfully use this book In an effort to provide the reader with a cutting edge approach to one of the most dynamic often subtle complex and still rapidly evolving areas of modern research nonlinear physics we have made extensive use of the symbolic numeric and plotting capabilities of the Maple software system applied to examples from these disciplines No prior knowledge of Maple or computer programming is assumed the reader being gently introduced to Maple as an auxiliary tool as the concepts of nonlinear science are developed The CD ROM provided with this book gives a wide variety of illustrative nonlinear examples solved with Maple In addition numerous annotated examples are sprinkled throughout the text and also placed on the CD An accompanying set of experimental activities keyed to the theory developed in Part I of the book is given in Part II These activities allow the student the option of hands on experience in exploring nonlinear phenomena in the REAL world Although the experiments are easy to perform they give rise to experimental and theoretical complexities which are not to be underestimated

Laboratory Manual for Nonlinear Physics with Maple for Scientists and Engineers Richard H. Enns, George C. McGuire, 2012-12-06 Science demands that all theory must be checked by experiment Richard Feynman Nobel Laureate in physics 1965 reminds us in a wonderful quote that The test of all knowledge is experiment Experiment is the sole judge of scientific truth 1 It is because nonlinear physics can be so profoundly counter intuitive that these laboratory investigations are so important This manual is designed to be used with the text *Nonlinear Physics with Maple for Scientists and Engineers* Understanding is enhanced when experiments are used to check so please attempt as many of the activities as you can As you perform theory these activities we hope that you will be amazed and startled by strange behavior intrigued and terrorized by new ideas and be able to amaze your friends as you relate your strange sightings Remember that imagination is just as important as knowledge so exercise yours whenever possible But please be careful as nonlinear activities can be addicting can provide fond memories and can awaken an interest that lasts a lifetime Although it has been said that a rose by any other name is still a rose with apologies to Shakespeare the authors of this laboratory manual have in an endeavor to encourage the use of these nonlinear investigations called them experimental activities rather than experiments A number of design innovations have been introduced A

Nonlinear Physics with Mathematica for Scientists and Engineers
Richard H. Enns, George C. McGuire, 2012-12-06 Nonlinear physics continues to be an area of dynamic modern research with applications to physics engineering chemistry mathematics computer science biology medicine and economics In this text extensive use is made of the Mathematica computer algebra system No prior knowledge of Mathematica or programming is

assumed This book includes 33 experimental activities that are designed to deepen and broaden the reader's understanding of nonlinear physics These activities are correlated with Part I the theoretical framework of the text

Nonlinear Physics with Maple for Scientists and Engineers Richard Enns, George McGuire, 2013-11-27

Philosophy of the Text This text has been designed to be an introductory survey of the basic concepts and applied mathematical methods of nonlinear science Students in engineering physics chemistry mathematics computing science and biology should be able to successfully use this text In an effort to provide the students with a cutting edge approach to one of the most dynamic often subtle complex and still rapidly evolving areas of modern research nonlinear physics we have made extensive use of the symbolic numeric and plotting capabilities of Maple V Release 4 applied to examples from these disciplines No prior knowledge of Maple or computer programming is assumed the reader being gently introduced to Maple as an auxiliary tool as the concepts of nonlinear science are developed The diskette which accompanies the text gives a wide variety of illustrative nonlinear examples solved with Maple An accompanying laboratory manual of experimental activities keyed to the text allows the student the option of hands on experience in exploring nonlinear phenomena in the REAL world Although the experiments are easy to perform they give rise to experimental and theoretical complexities which are not to be underestimated

The Level of the Text The essential prerequisites for the first eight chapters of this text would normally be one semester of ordinary differential equations and an intermediate course in classical mechanics

Laboratory Manual for Nonlinear Physics with Maple for Scientists and Engineers Richard H. Enns, George McGuire, 1997-03-20

Science demands that all theory must be checked by experiment Richard Feynman Nobel Laureate in physics 1965 reminds us in a wonderful quote that The test of all knowledge is experiment Experiment is the sole judge of scientific truth 1 It is because nonlinear physics can be so profoundly counter intuitive that these laboratory investigations are so important This manual is designed to be used with the text Nonlinear Physics with Maple for Scientists and Engineers Understanding is enhanced when experiments are used to check so please attempt as many of the activities as you can As you perform theory these activities we hope that you will be amazed and startled by strange behavior intrigued and terrorized by new ideas and be able to amaze your friends as you relate your strange sightings Remember that imagination is just as important as knowledge so exercise yours whenever possible But please be careful as nonlinear activities can be addictive can provide fond memories and can awaken an interest that lasts a lifetime Although it has been said that a rose by any other name is still a rose with apologies to Shakespeare the authors of this laboratory manual have in an endeavor to encourage the use of these nonlinear investigations called them experimental activities rather than experiments A number of design innovations have been introduced

Announcer

American Association of Physics Teachers, 1996

Nonlinear Physics with Maple for Scientists and Engineers Richard H Enns, George C McGuire, 2000-05-11

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Cuza" din Iasi Universitatea "Al. I. Cuza" din Iasi,2001 *Nonlinear Physics with Maple for Scientists and Engineers /*
Experimental Activities in Nonlinear Physics Richard Enns,George McGuire,1997-03-20 **Choice** ,2002 *Applied*
Physics ,1983 **Energy Research Abstracts** ,1988 The Software Encyclopedia ,1986 **Applied Mechanics**
Reviews ,1992 Forthcoming Books Rose Arny,2003-04 **The Cumulative Book Index** ,1996 A world list of books in
the English language Physics Briefs ,1993

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