TEXTBOOKS in MATHEMATICS

Although the theory associated with nonlinear systems is advanced, generating a numerical solution with a computer and interpreting that solution are fairly elementary. Designed to be independent of any particular software package, **Ordinary Differential Equations: Applications, Models, and Computing** emphasizes the use of computer software in solving various types of differential equations.

Providing an even balance between theory, computer solution, and application, the text discusses the theorems and applications of the first-order initial value problem, including learning theory models, population growth models, epidemic models, and chemical reactions. It then examines the theory for n-th order linear differential equations and the Laplace transform and its properties, before addressing several linear differential equations with constant coefficients that arise in physical and electrical systems. The author also presents systems of first-order differential equations as well as linear systems with constant coefficients that arise in physical systems, such as coupled spring-mass systems, pendulum systems, the path of an electron, and mixture problems. The final chapter introduces techniques for determining the behavior of solutions to systems of first-order differential equations without first finding the solutions.

Features

- Emphasizes the use of software to aid in problem solving
- Includes numerical case studies that highlight possible pitfalls when computing a numerical solution without first considering the appropriate theory
- Covers nonlinear differential equations and nonlinear systems
- Shows how to solve various mathematical models, such as population growth, epidemic, and predator-prey models
- Discusses fundamental existence, uniqueness, and continuation theorems
- Contains a CD-ROM with the software programs used in the text
- Requires no prior knowledge of programming languages

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