

Ordinary differential equations in theory and practice

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Deskripsi Lengkap: <https://lib.ui.ac.id/detail?id=20451116&lokasi=lokal>

Abstrak

In order to emphasize the relationships and cohesion between analytical and numerical techniques, Ordinary Differential Equations in Theory and Practice presents a comprehensive and integrated treatment of both aspects in combination with the modeling of relevant problem classes. This text is uniquely geared to provide enough insight into qualitative aspects of ordinary differential equations (ODEs) to offer a thorough account of quantitative methods for approximating solutions numerically, and to acquaint the reader with mathematical modeling, where such ODEs often play a significant role.

Although originally published in 1995, the text remains timely and useful to a wide audience. It provides a thorough introduction to ODEs, since it treats not only standard aspects such as existence, uniqueness, stability, one-step methods, multistep methods, and singular perturbations, but also chaotic systems, differential-algebraic systems, and boundary value problems. The authors aim to show the use of ODEs in real life problems, so there is an extended chapter in which not only the general concepts of mathematical modeling but also illustrative examples from various fields are presented. A chapter on classical mechanics makes the book self-contained.