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Theory and examples of ordinary differential equations. (English) Zbl 1241.34001

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From the preface: This book is intended for undergraduate students majoring in mathematics who have studied calculus and are now reading advanced calculus and linear algebra. It would also be of interest to mathematics researchers, since it covers the theory as completely as possible. Because of its many examples and detailed solutions, this book might be found useful as well by students with their majors other than mathematics.

As is revealed by its contents, this book consists of eight chapters. Chapter 1 is on linear equations and Chapter 2 on systems of linear first order equations. Chapter 3 is on power series solutions and Chapter 4 on adjoint operators and nonhomogeneous boundary value problems. Chapter 5 is on Green functions and Chapter 6 on eigenfunction expansions. Finally, Chapter 7 is on long time behavior of systems of differential equations and Chapter 8 on existence and uniqueness theorems.

The proof of the main results requires mostly the knowledge of advanced calculus and linear algebra, and partly the knowledge of a complex variable. As a handy reference, such a knowledge is always provided where it is needed. This applies to the section about the extension of the main results where sometimes requires more advanced materials. Such a section might be skipped in the first reading of this book.

MSC:

- 34-01** Introductory exposition (textbooks, tutorial papers, etc.) pertaining to ordinary differential equations
- 34A30** Linear ordinary differential equations and systems
- 34A25** Analytical theory of ordinary differential equations: series, transformations, transforms, operational calculus, etc.
- 34B15** Nonlinear boundary value problems for ordinary differential equations
- 34B27** Green's functions for ordinary differential equations
- 34L10** Eigenfunctions, eigenfunction expansions, completeness of eigenfunctions of ordinary differential operators
- 34D05** Asymptotic properties of solutions to ordinary differential equations