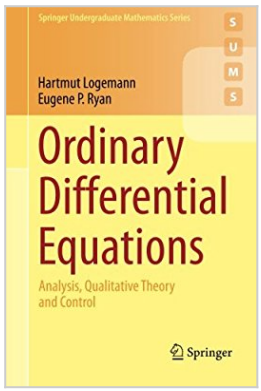

Ordinary Differential Equations: Analysis, Qualitative Theory and Control (Springer Undergraduate Mathematics Series)

By Hartmut Logemann, Eugene P. Ryan

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The book comprises a rigorous and self-contained treatment of initial-value problems for ordinary differential equations. It additionally develops the basics of control theory, which is a unique feature in current textbook literature.

The following topics are particularly emphasised:

• existence, uniqueness and continuation of solutions,
• continuous dependence on initial data,
• flows,
• qualitative behaviour of solutions,
• limit sets,
• stability theory,
• invariance principles,
• introductory control theory,
• feedback and stabilization.

The last two items cover classical control theoretic material such as linear control theory and absolute stability of nonlinear feedback systems. It also includes an introduction to the more recent concept of input-to-state stability.

Only a basic grounding in linear algebra and analysis is assumed. *Ordinary Differential Equations* will be suitable for final year undergraduate students of mathematics and appropriate for beginning postgraduates in mathematics and in mathematically oriented engineering and science.

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Editorial Review

Review

From the book reviews:

“This new textbook on ordinary differential equations offers a surprisingly fresh approach to the subject by incorporating an introduction to control theory into a rigorous treatment of initial value problems. The work is written at an intermediate level and aimed at students of mathematics and mathematically-oriented engineering. … The book is characterized throughout by strong writing, clear and complete proofs, good examples and plenty of exercises.” (William J. Satzer, MAA Reviews, January, 2015)

“The text concerns itself primarily with systems of linear differential equations. Logemann and Ryan immediately give examples of applications that are referred to and expanded on later in the text. This approach, as well as the dispersal of exercises throughout the text (as opposed to only at the end of each chapter), keeps students engaged. Summing Up: Recommended. Upper-division undergraduates through researchers/faculty.” (J. T. Zerger, Choice, Vol. 52 (5), January, 2015)

“This book is one of several recent textbooks on ordinary differential equations intended for use in an undergraduate (and not only) course. If one wants to have a self-contained book dealing with the basic theory of initial value problems … . then he/she must take a look at this very interesting book written by two experts on the field, Hartmut Logemann and Eugene Ryan. … the book consists of six chapters plus an appendix.” (George Karakostas, zbMATH, Vol. 1300, 2015)

From the Back Cover

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Hartmut Logemann is a Professor in the Department of Mathematical Sciences, University of Bath, UK. He has taught a large variety of topics, including courses in complex analysis, control theory, engineering mathematics, Lyapunov theory, ordinary differential equations and semigroups of linear operators. His research interests are in mathematical systems and control theory with emphasis on infinite-dimensional systems, nonlinearity, positivity and sampled-data control.

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