

# Differential and Integral Equations

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## Preface

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## *Preface*

The present book is devoted to certain problems which belong to the domain of integral equations and boundary value problems for differential equations. Its essential part is concerned with linear systems of integral and generalized differential equations having in general discontinuous solutions of bounded variation on an interval. For various types of boundary value problems we derive adjoint problems in order to provide solvability conditions based on the principles of functional analysis.

Our exposition starts with an introductory chapter on linear algebra, functional analysis, Perron-Stieltjes integral and functions of bounded variation. In this chapter we collect some results needed in the other parts of the book. The second chapter contains results on integral operators in the Banach space of functions of bounded variation on an interval and basic results concerning linear Fredholm-Stieltjes and Volterra-Stieltjes integral equations in this space. Generalized linear differential equations are studied in the third chapter. Chapters IV and V deal with linear boundary value problems for ordinary differential and integro-differential operators while the last chapter is devoted to the perturbation theory for nonlinear ordinary differential equations with nonlinear side conditions.

Our conventions on cross references are as follows: For example, III.2.1 refers to paragraph 1 in section 2 of the third chapter while 2.1 refers to paragraph 1 in section 2 of the current chapter. The same applies to formulas whose numbers are given in parentheses, i.e. (III.2,1) is the first formula in section 2 of the third chapter while (2,1) stands for the first formula in section 2 of the current chapter. Bibliographical references include the name of the author followed by a number in square brackets which refers to the list of the bibliography given at the end of the book.

We wish express our gratitude to Professor Jaroslav Kurzweil for his continuous support dating back to the beginning of our work in this field. His results on generalized differential equations, Perron-Stieltjes integral as well as his ideas concerning general boundary value problems underlie the results contained in this book.

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The authors