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C. Corduneanu

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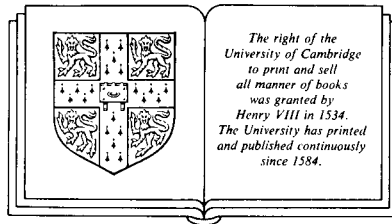
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C. CORDUNEANU

The University of Texas at Arlington



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Preface

In the author's view, this book has at least three objectives. First, the book aims to serve as a (graduate) textbook of integral equations. The first chapter introduces the reader to the subject, in the third chapter several basic facts are included on Volterra type equations (both classical and abstract), while the remaining chapters cover a variety of topics to be selected to suit the particular interest of the instructor and students. Second, the book is aimed to serve as a reference in the field of integral equations and some of their applications. Of course, I cannot claim to provide comprehensive coverage of this fast-developing area of research, but I hope that the topics featured in the book will convince the reader that integral equations constitute a very useful and successful tool in contemporary research, unifying many particular results available for other classes of functional equations (differential, integrodifferential, delayed argument). Third, the book provides a good number of results, and describes methods, in the field of integral equations, a feature that will help the young researcher to become acquainted with this field and continue the investigation of the topics whose presentation in the book suggests further development.

Most of the material included in the book is accessible to any reader with a reasonable background in real analysis, and some acquaintance with the introductory concepts of functional analysis. There are several sections which require more sophisticated knowledge of functional analysis (both linear and nonlinear). In such cases, some direction is given, and adequate references are provided. These references are usually to books and monographs dealing with such topics in more depth; only in a very few (perhaps half a dozen) cases is the reader referred to journal papers containing such results. Of course, there are many references to journal papers, but those are aimed at indicating the origination of the results, or contain supplementary material directly related to the text.

Since a rather detailed description of the contents is given in the introduction,

together with some historical considerations related to integral equations, I do not find it necessary to dwell upon this aspect here.

I think it is appropriate to make precise the relationship between this volume and the volumes I have published in the past on this subject (see C. Corduneanu [4] and [6] in the References). The material in [6] is covered in the first chapter of this book, but under different assumptions. For instance, the basic Fredholm theory is presented in the L^2 -space, instead of the space of continuous functions. Unlike in [6], the idea of approximating general kernels by means of finite-dimensional kernels is used. With regard to [4], in practical terms, there are no repetitions. Some topics, particularly the admissibility results, have been dealt with again but under totally new conditions. More precisely, new developments related to some topics in [4] have found a place in the present book. The same is true with regard to the stability problems for nuclear reactors. Although more than 60% of the contents of [4] is devoted to convolution equations, there are relatively few convolution results in this book.

With regard to the list of references at the end of this volume I would like to mention that I have tried to include any book on the theory of integral equations, old or new, including books dedicated to applications or numerical treatment of these equations. I have left aside titles dealing with the theory of singular integral equations, which have many applications in continuum mechanics and other fields. I have also avoided titles on stochastic integral equations, despite the growing interest in this area. The reason for these omissions is that it is impossible to cover adequately in a single volume such a diversity of topics.

It is generally understood that carrying out a project like this necessitates a good deal of cooperation and interaction. I am particularly indebted for various forms of help in connection with this project to the following colleagues: S. Aizicovici, from Ohio University, Athens, Ohio; T. A. Burton, from Southern Illinois University, Carbondale; D. A. Carlson, from Southern Illinois University; M. Kwapisz, from the University of Gdansk, Poland; A. Korzeniowski, from the University of Texas at Arlington; N. H. Pavel, from Ohio University, Athens, Ohio; J. J. Schaffer, from Carnegie-Mellon University in Pittsburgh; O. Staffans, from Helsinki University of Technology, Espoo, Finland. Professor Staffans read the whole manuscript and suggested many corrections and improvements. It is my duty and my pleasure to express my sincere thanks to all the colleagues mentioned above. Several copies of the manuscript have circulated since the summer of 1988, and numerous remarks and comments have reached me in time for me to take them into account in the final version of the manuscript.

The historical sketch of the theory of integral equations in the introduction was written in conjunction with G. Bantaş from University of Iaşi, Romania. I thank him for his cooperation.

In the technical preparation of the manuscript, constant help has been provided by two of the secretaries in the Department of Mathematics at the

University of Texas, Arlington: Marjorie Nutt and Sue Sholar. I gratefully acknowledge their support during the project.

Also, I would like to take this opportunity to acknowledge the following sources of support for the completion of this project (in the form of a Summer research salary, or as travel grants, or both): The Graduate School of the University of Texas at Arlington; the Oberwolfach Mathematisches Forschungsinstitut; the Office of the Chief of Naval Research; the National Research Council of Italy (CNR); the US Army Research Office (Durham, NC). This support has certainly helped to bring the project into being in a shorter time.

Finally, my gratitude is directed to Cambridge University Press whose interest in this project has provided me from the start with strong motivation and encouragement.

C. Corduneanu