



# Distributions, Partial Differential Equations, and Harmonic Analysis (Universitext)

By Dorina Mitrea

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The theory of distributions constitutes an essential tool in the study of partial differential equations. This textbook would offer, in a concise, largely self-contained form, a rapid introduction to the theory of distributions and its applications to partial differential equations, including computing fundamental solutions for the most basic differential operators: the Laplace, heat, wave, Lam'e and Schrodinger operators.

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## **Editorial Review**

### Review

“The book is very carefully written and its emphasis on applications in partial differential equations does justice to the nature and importance of the theory of distributions in modern analysis. An attractive feature of this work is the large number of exercises including solutions, both interspersed in the text and following each chapter. It is an ideal starting point to delve into the theory of distributions.” (M. Kunzinger, Monatshefte für Mathematik, 2015)

“The monograph under consideration aims at a thorough introduction to ideas and techniques of distribution theory with application to partial differential equations. ... the first part of this book is an excellent and carefully written introduction to the ideas and first applications of distribution theory which can be recommended for self-study for graduate students, while the second part contains a great variety of explicit formulas for tempered fundamental solutions interesting for the specialists in that area.” (Michael Langenbruch, zbMATH 1308.46002, 2015)

“The book under review deals with the distribution theory and its applications to partial differential equations. ... proofs are extremely detailed for the benefit of beginners, and there are a large number of exercises, more than half of which are accompanied by solutions. ... one appreciates the author’s remarkable effort to present the subject in a form as clear and accessible as possible ... . This makes this textbook ideal for upper undergraduate to graduate level courses on the subject.” (Fabio Nicola, Mathematical Reviews, September, 2014)

### From the Back Cover

The aim of this book is to offer, in a concise, rigorous, and largely self-contained manner, a rapid introduction to the theory of distributions and its applications to partial differential equations and harmonic analysis.

The book is written in a format suitable for a graduate course spanning either over one-semester, when the focus is primarily on the foundational aspects, or over a two-semester period that allows for the proper amount of time to cover all intended applications as well. It presents a balanced treatment of the topics involved, and contains a large number of exercises (upwards of two hundred, more than half of which are accompanied by solutions), which have been carefully chosen to amplify the effect, and substantiate the power and scope, of the theory of distributions.

Graduate students, professional mathematicians, and scientifically trained people with a wide spectrum of mathematical interests will find this book to be a useful resource and complete self-study guide.

Throughout, a special effort has been made to develop the theory of distributions not as an abstract edifice but rather give the reader a chance to see the rationale behind various seemingly technical definitions, as well as the opportunity to apply the newly developed tools (in the natural build-up of the theory) to concrete problems in partial differential equations and harmonic analysis, at the earliest opportunity.

About the Author

Dorina Mitrea is a Professor at University of Missouri in the Mathematics Department.

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