Preface

This book originated as the lecture notes for a course in partial differential equations taught two years ago, quite by a chance and for the first time in my teaching career (I am an algebraist).

The topics covered in the book are the standard topics of a one-semester undergraduate course in partial differential equations (PDEs).

The first chapter introduces basic concepts and notation. The second chapter is devoted to the technique of change of variables in PDEs (judging by my own experience as a lecturer, the students often find the workings of the technique, which is first studied in multivariable calculus and almost never in sufficient detail, both mysterious and mystifying, whence the need to dispel the mist).

The third chapter deals with first-order linear PDEs with constant coefficients. The main topic of the fourth chapter is the method of characteristics for first-order semilinear PDEs.

First-order quasilinear equations are studied in Chapters 5–7: Chapter 5 introduces the subject, Chapter 6 is devoted to description of solution sets of first-order quasilinear PDEs, and Chapter 7 deals with the method of characteristics for this class of PDEs. Some parts of Chapters 5–7 may be considered as suitable for a graduate course in PDEs.

The main topic of the final Chapter 8 is second-order semilinear PDEs.

Throughout the book, we give numerous examples on the usage of Maple and the popular online resource Wolfram Alpha for solving problems related to the theory of PDEs. No prior knowledge of Maple, or prior experience of using Wolfram Alpha is required.

Added in proof. This book was in production during the murkiest days of the COVID-19 outbreak in Europe. It is with no small amount of admiration that I feel myself obliged to acknowledge the calm professionalism of the staff of my publisher De Gruyter and the typesetting company VTeX. My special thanks to Nadja Schedensack of De Gruyter and Ina Talandienė of VTeX.

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