

# Preface

My book “Pseudo-Differential Operators and Markov Processes” appeared almost five years ago and was intended to be an enlarged survey explaining both analysts and probabilists the interaction of Fourier analysis and the theory of pseudo-differential operators (with negative definite symbols) with the theory of Feller processes and Dirichlet forms. It contains essentially no proofs, only some estimates needed to construct processes starting with certain pseudo-differential operators were included.

This volume is the first of three with the titles “Pseudo-Differential Operators and Markov Processes”

- I.** Fourier Analysis and Semigroups,
- II.** Generators and Potential Theory,
- III.** Markov Processes and Applications.

This time my intention is to provide complete proofs as well as a detailed discussion of related results in the literature. Moreover, I include many new results, partly not yet published but in print, partly they will not be published elsewhere. Many of these new results are due to my former PhD-students Walter Hoh and René L. Schilling.

One of the major difficulties in writing the book was that in different fields of mathematics different notations and normalizations were used for one and the same object, think of the Fourier transform. I hope that, finally, I have arrived at a consistent presentation. A second, much larger problem was and still is the enormous amount of work done in fields we have to deal with. Although I tried to give fair credits in the notes, it might happen that I missed certain contributions or was not aware of the correct historical development.

In particular, it is hard for a non-French mathematician not being a member of the former Séminaire Brelot-Choquet-Deny to have an overview of the achievements of the contributors to this seminar. It should be emphasized that our field owes very much to the work of the participants of this seminar. Beside the publications of this seminar the monograph of C. Dellacherie and P.-A. Meyer [68]–[72] is a useful source. Personally, I am deeply indebted to F. Hirsch who from time to time politely corrected my way of interpreting the origin of some results.

Preparing this volume I received support from many sides. First of all I want to thank R.L. Schilling who read the whole manuscript, suggested many improvements and partly, in reading a first version of the manuscript proposed different proofs or even proved new results which I was allowed to include immediately. I also want to thank W. Hoh for comments to parts of the manuscript and for allowing me to use some of his unpublished results, a fact which will become even more important in volumes 2 and 3.

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