

Preface to the Second Edition

This text is a slightly modified version of my Lecture Note *Multiple Wiener-Itô integrals with applications to limit theorems* published in the *Lecture Notes in Mathematics* series (number 849) of the Springer Verlag in 1981. I decided to write a revised version of this Lecture Note after a special course I held about its subject in the first semester of the academic year 2011–2012 at the University of Szeged. Preparing for this course I observed how difficult the reading of formulas in this Lecture Note was. These difficulties arose because this Lecture Note was written at the time when the \TeX program still did not exist, and the highest technical level of typing was writing on an IBM machine that enabled one to type beside the usual text also mathematical formulas. But the texts written in such a way are very hard to read. To make my text more readable, I decided to retype it by means of the \TeX program. But it turned out that a real improvement of the text demands much more than producing nice, readable formulas. To make a really better version of this work, I also had to explain better the results and definitions together with the ideas and motivation behind them. Besides, I had to make not only more readable formulas but also more readable explanations. The reader must see at each point of the discussion what is just going on and why. In the new version of this work, I tried to satisfy these demands. Naturally, I also corrected the errors I found. At some points I had to insert a rather long explanation in the proof, because I met such a statement which seemed to be trivial at the first sight, but its justification demanded a detailed discussion. I hope that these insertions did not make the work less transparent.

There appeared many new results about the subject of this Lecture Note since its first appearance. The question arose naturally whether I should insert them to the new edition of this work. Finally I decided to make no essential changes in the text, to restrict myself to the correction of the errors I found and to give a more detailed explanation of the proofs where I felt that it is useful. In making such a decision I

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was influenced by a Russian proverb which says: “Лучше враг хоповшего”. I tried to follow the advice of this proverb. (I do not know of an English counterpart of this proverb, but it has a French version: “Le mieux est l’ennemi du bien”).

I made one exception. I decided to explain those basic notions and results in the theory of generalized functions which were applied in the older version of this work in an implicit way. In particular, I tried to explain with their help how one gets those results about the spectral representation of the covariance function of stationary random fields that I have presented under the names *Bochner’s theorem* and *Bochner–Schwartz theorem*. This extension of the text is contained in the attachments to Chaps. 1 and 3. In the first version I only referred to a work where these notions and results can be found. But now I found such an approach not satisfactory, because these notions and results play an important role in some arguments of this work. Hence I felt that to make a self-contained presentation of the subject, I have to explain them in more detail.

The first edition of this Lecture Note appeared long time ago, but the main question discussed in it, the description of the limit behaviour of appropriately normalized partial sums of strongly dependent random variables remained an open problem. Also the method applied in this work remained an important tool in the study of such problems. Hence a self-contained explanation of the theory which provides a good foundation for this method is useful. By my hopes this Lecture Note contains such an explanation, and therefore it did not become out of date. This was the main argument for myself to write a new version of this work where I tried to present a better and more accessible discussion.

I would like to write some words about the last chapter of this work, where some results are discussed that seemed to be important at the time of writing the first version. I would mention two of them which later turned out to be really important. The first one is the Nelson–Gross inequality which later played an important role in the theory of the so-called hypercontractive and logarithmic Sobolev inequalities. The second one is a method for construction of non-trivial self-similar fields worked out in a paper of Kesten and Spitzer. Several important limit theorems are based on the ideas of this paper. It is worth mentioning that it was Roland L’vovich Dobrushin who called my attention to these results, and he emphasized their importance. So I would like to finish this preface with a personal remark about him.

This work is the result of some joint research with Roland L’vovich Dobrushin. Although the book was written by me alone, Dobrushin’s influence is very strong in it. I have learned very much from him. It is rather difficult to explain what one could learn from him, because it was much more than just some results or mathematical arguments. There was something beyond it, some world view which is hard to explain. If I could give back something from what I had learned from him in this Lecture Note, then this would justify the work on it by itself.

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