

Preface

The purpose of this monograph is to present a unified approach to a certain class of semimartingale inequalities, which have their roots at some classical problems in harmonic analysis. Preliminary results in this direction were obtained by Burkholder in 60s and 70s during his work on martingale transforms and geometry of UMD Banach spaces. The rapid development in the field occurred after the appearance of a large paper of Burkholder in 1984, in which he described a powerful method to handle martingale inequalities and used it to obtain a number of interesting results. Since then, the method has been extended considerably in many directions and successfully implemented in the study of related problems in various areas of mathematics.

The literature on the subject is very large. One of the objectives of this exposition is to put most of the existing results together, explain in detail the underlying concepts and point out some connections and similarities. This book contains also a number of new results as well as some open problems, which, we hope, will stimulate the reader's further interest in this field. The recent applications of the above results in the theory of quasiregular mappings (with deep implications in geometric function theory), Fourier multipliers as well as their connections to rank-one convexity and quasiconvexity indicate the need of further developing this area.

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