

<<大维随机矩阵的谱分析>>

图书基本信息

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前言

The ongoing developments being made in large dimensional data analysis continue to generate great interest in random matrix theory in both theoretical investigations and applications in many disciplines. This has doubtlessly contributed to the significant demand for this monograph, resulting in its first printing being sold out. The authors have received many requests to publish a second edition of the book. Since the publication of the first edition in 2006, many new results have been reported in the literature. However, due to limitations in space, we cannot include all new achievements in the second edition. In accordance with the needs of statistics and signal processing, we have added a new chapter on the limiting behavior of eigenvectors of large dimensional sample covariance matrices. To illustrate the application of RMT to wireless communications and statistical finance, we have added a chapter on these areas. Certain new developments are commented on throughout the book. Some typos and errors found in the first edition have been corrected. The authors would like to express their appreciation to Ms. Lii Hong for her help in the preparation of the second edition. They would also like to thank Professors Ying-Chang Liang, Zhaoben Fang, Baoxue Zhang, and Shurong Zheng, and Mr. Jiang Hu, for their valuable comments and suggestions. They also thank the copy editor, Mr. Hal Heinglein, for his careful reading, corrections, and helpful suggestions. The first author would like to acknowledge the support from grants NSFC 10871036, NUS R-155-000-079-112, and R-155-000-096-720.

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内容概要

The aim of the book is to introduce basic concepts, main results, and widely applied mathematical tools in the spectral analysis of large dimensional random matrices. The core of the book focuses on results established under moment conditions on random variables using probabilistic methods, and is thus easily applicable to statistics and other areas of science. The book introduces fundamental results, most of them investigated by the authors, such as the semicircular law of Wigner matrices, the Marcenko-Pastur law, the limiting spectral distribution of the multivariate F-matrix, limits of extreme eigenvalues, spectrum separation theorems, convergence rates of empirical distributions, central limit theorems of linear spectral statistics, and the partial solution of the famous circular law. While deriving the main results, the book simultaneously emphasizes the ideas and methodologies of the fundamental mathematical tools, among them being: truncation techniques, matrix identities, moment convergence theorems, and the Stieltjes transform. Its treatment is especially fitting to the needs of mathematics and statistics graduate students and beginning researchers, having a basic knowledge of matrix theory and an understanding of probability theory at the graduate level, who desire to learn the concepts and tools in solving problems in this area. It can also serve as a detailed handbook on results of large dimensional random matrices for practical users. This second edition includes two additional chapters, one on the authors' results on the limiting behavior of eigenvectors of sample covariance matrices, another on applications to wireless communications and finance. While attempting to bring this edition up-to-date on recent work, it also provides summaries of other areas which are typically considered part of the general field of random matrix theory.

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