

图书基本信息

书名：<<高维随机矩阵的谱理论及其在无线通信和金融统计中的应用>>

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## 前言

大学最重要的功能是向社会输送人才。大学对于一个国家、民族乃至世界的重要性和贡献度，很大程度上是通过毕业生在社会各领域所取得的成就来体现的。中国科学技术大学建校只有短短的50年，之所以迅速成为享有较高国际声誉的著名大学之一，主要就是因为她培养出了一大批德才兼备的优秀毕业生。他们志向高远、基础扎实、综合素质高、创新能力强，在国内外科技、经济、教育等领域做出了杰出的贡献，为中国科大赢得了“科技英才的摇篮”的美誉。2008年9月，胡锦涛总书记为中国科大建校五十周年发来贺信，信中称赞说：半个世纪以来，中国科学技术大学依托中国科学院，按照全院办校、所系结合的方针，弘扬红专并进、理实交融的校风，努力推进教学和科研工作的改革创新，为党和国家培养了一大批科技人才，取得了一系列具有世界先进水平的原创性科技成果，为推动我国科教事业发展和社会主义现代化建设做出了重要贡献。据统计，中国科大迄今已毕业的5万人中，已有42人当选中国科学院和中国工程院院士，是同期（自1963年以来）毕业生中当选院士数最多的高校之一。其中，本科毕业生中平均每1,000人就产生1名院士和700多名硕士、博士，比例位居全国高校之首。还有众多的中青年才俊成为我国科技、企业、教育等领域的领军人物和骨干。在历年评选的“中国青年五四奖章”获得者中，作为科技界、科技创新型企业青年才俊代表，科大毕业生已连续多年榜上有名，获奖总人数位居全国高校前列。鲜为人知的是，有数千名优秀毕业生踏上国防战线，为科技强军做出了重要贡献，涌现出20多名科技将军和一大批国防科技中坚。

## 内容概要

本书讲述了随机矩阵谱理论的主要结果和前瞻研究，以及它在无线通信和现代金融风险理论中的应用。

书中前面讲解基本知识，后面分析重要范例，全面介绍了随机矩阵谱理论在这两个领域中的成果。

本书对其他需要高维数据分析的领域，能起到示范作用。

本书可作为统计学、计算机科学、现代物理、量子力学、无线通信、金融工程、经济学等领域本科生、研究生和工程技术人员学习随机矩阵理论的重要参考资料。

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## 章节摘录

In applications of the asymptotic theorems of spectral analysis of large di-mensional random matrices, two important problems arose after the LSD was found. The first is the bound on extreme eigenvalues; the second is the convergence rate of the ESD, with respect to sample size. For the first problem, the literature is extensive. The first success was due to Geman ( 1980 ), who proved that the largest eigenvalue of a sample covariance matrix converges almost surely to a limit under a growth condition on all the moments of the underlying distribution. Yin, Bai, and Krishnaiah ( 1988 ) proved the same result under the existence of the 4th order moment, and Bai, Silverstein, and Yin ( 1988 ) proved that the existence of the 4th order moment is also necessary for the existence of the limit. Bai and Yin ( 1988b ) found the necessary and sufficient conditions for almost sure convergence of the largest eigenvalue of a Wigner matrix. By the symmetry between the largest and smallest eigenvalues of a Wigner matrix, the necessary and sufficient conditions for almost sure convergence of the smallest eigenvalue of a Wigner matrix were also found. Comparing to almost sure convergence of the largest eigenvalue of a sample covariance matrix, a relatively harder problem is to find the limit of the smallest eigenvalue of a large dimensional sample covariance matrix. The first attempt made in Yin, Bai, and Krishnaiah ( 1983 ) proved that the almost sure limit of the smallest eigenvalue of a Wishart matrix has a positive lower bound when the ratio of dimension to the degrees of freedom is less than  $1/2$ .

编辑推荐

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