

Applications of large-dimensional random matrix methods in wireless communications

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Abstract

Exact analysis for system performances of some complex wireless systems could be difficult and for some models unsolvable. In the last few years, large-system approaches has emerged as a means to circumvent the mathematical difficulties, greatly motivated by the landmark contributions of Verdú–Shamai and Tse–Hanly using large-dimensional random matrix theory (RMT) to various problems in information theory. Since then, a large body of performance analyses of various wireless channels were obtained by large-dimensional random matrix tools such as the Stieltjes transform method (or the Bai–Silverstein method), the Gaussian methods (integration by part and the Poincaré–Nash inequality), the free probability, and the replica method. In this talk, I will provide an introduction to show how large-dimensional RMT can be used to tackle a variety of problems in wireless communications.