

Séminaire de printemps 2007 du III Cycle Romand de Statistique

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Random matrices

Jack Silverstein, North-Carolina State University

These lectures will introduce spectral properties of several different ensembles of random matrices, fundamental to multivariate statistics, wireless communications, and array signal processing. The behavior of their eigenvalues are needed in situations where the dimensions of the matrices are large, but conventional probabilistic analysis cannot be applied. The results I will cover are limit theorems, as the dimensions approach infinity, on the eigenvalues. I will introduce an essential tool in deriving these results, namely the Stieltjes transform, and proceed in outlining several of the known results. The lectures will begin with outlines of proofs of the main limiting property: almost sure convergence of the empirical distribution of the eigenvalues. Emphasis will be made on understanding where randomness governs limiting behavior, and where basic properties of matrices comes into play.