Joint Statistic Seminar
Hong Kong University of Science and Technology

Large Random Matrices and their applications to Wireless Communication

by

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Venue: Room 3315 (Lifts 17/18)

Abstract

In this talk, we will present recent results on large random matrices and their applications to Digital Communication. In particular, we will emphasize the fact that the tools issued from Random Matrix Theory are very relevant to compute well-known performance indexes in the framework of wireless channels, such as Shannon mutual information. The interest in such problems takes its roots in the seminal work of Telatar (late nineties). In order to describe the problem, consider a matrix XX^* where X is a $N \times n$ matrix with random entries and assume that the number of columns of X grows at the same speed as its number of rows, i.e. N/n converges to $c \in (0, \infty)$. Given a statistical model over the entries of X (that takes into account the physical properties of the channel), one has to describe as precisely as possible the spectrum of XX^*. It turns out that in many cases the empirical distribution of the spectrum (which is random) converges toward a deterministic probability distribution. We will take advantage of this to describe the limiting behaviour as well as the fluctuations of the following functional of the eigenvalues

$$I = \frac{1}{N} \log \det \left(I_N + \frac{XX^*}{\rho} \right),$$

which plays a central role in wireless communication.

All interested are welcome!
For details, please contact the ISMT Department.