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Fluctuations for Products of Random Matrices

FRIDAY, January 31, 2020 at 4:00 PM
Jones 303, 5747 S. Ellis Avenue

ABSTRACT

Products of large random matrices appear in many modern applications such as high dimensional statistics (MANOVA estimators), machine learning (Jacobians of neural networks), and population ecology (transition matrices of dynamical systems). Inspired by these situations, this talk concerns global limits and fluctuations of singular values of products of independent random matrices as both the size $N$ and number $M$ of matrices grow. As $N$ grows, I will show for a variety of ensembles that fluctuations of the Lyapunov exponents converge to explicit Gaussian fields which transition from log-correlated for fixed $M$ to having a white noise component for $M$ growing with $N$. I will sketch our method, which uses multivariate generalizations of the Laplace transform based on the multivariate Bessel function from representation theory.