THE UNIVERSITY OF HONG KONG

Institute of Mathematical Research
Department of Mathematics

Probability Seminar

Kac-Rice inspired approach to non-Hermitian random matrices

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Abstract

We will discuss a method of analyzing the joint probability density (JPD) of an eigenvalue z and the associated right eigenvector $\mathbf{v}$ (normalized with $\mathbf{v}^*\mathbf{v} = 1$) for non-Hermitian random matrices of a given size $N \times N$. To illustrate utility of the general method I will derive and analyze the JPD for two particular examples: (i) one-parameter family of matrices interpolating between complex Ginibre and real Ginibre ensembles and (ii) a complex Ginibre matrix additively perturbed by a fixed matrix. In particular, in the former case I will discuss the formation of an excess of eigenvalues in the vicinity of the real axis on approaching the real Ginibre limit, which eventually gives rise to the existence of a new scaling regime of "weak non-reality" as $N \to \infty$. In the second case after providing general JPD I will briefly discuss a particular case of non-Hermitian Rosenzweig-Porter model which recently attracted considerable interest in physics literature. If time allows, I will discuss a generalization of the proposed method which is expected to be suitable for analysis of JPD involving both left- and right eigenvectors.

Date:	October 2, 2025 (Thursday)
Time:	4:00 – 5:00 pm
Venue:	ZOOM: https://hku.zoom.us/j/
	Meeting ID: 954 9657 8522
	Password: 304442

All are welcome