Department of Applied Mathematics and Statistics
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SEMINAR

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304 Whitehead Hall
Refreshments: 3:30 p.m.
Seminar: 4:00 p.m.

APPLICATIONS OF RANDOM MATRIX THEORY

Abstract

One of the interesting developments of mathematics over the past fifty years concerns the observation that many disparate objects in physics, in pure and applied mathematics, and in other branches of knowledge such as finance and engineering, can be modelled statistically using the eigenvalues of a matrix with random entries. Examples include distances between energy levels in complex systems, time intervals between bus arrival times in Cuernavaca (Mexico), distances between parked cars in London, zeros of Riemann's zeta function, and many other correlated quantities arising in various contexts. The analysis of eigenvalues of random matrices (stochastic eigenanalysis) goes back to the works of Wishart on multivariate statistics in the 1920s. Random Matrix Theory in the modern sense was initiated in the works of the physicist Wigner in the 1950s.

We view stochastic eigenalysis as the modern-day counterpart to stochastic differential equations. This talk surveys some of the important mathematical ideas, many of which represent a very modern development, as well as the computational software that is critical for the practical applications.