THE UNIVERSITY  OF HONG KONG

Institute of Mathematical Research
Department of Mathematics

LECTURES ON RANDOM MATRIX THEORY

Wigner matrices and the semicircular law

Professor Jianfeng Yao

Department of Statistics and Actuarial Science, HKU

Abstract

In these two lectures we will consider the family of Wigner matrices which are Hermitian (or symmetric) matrices with independent random entries. The nuclear physicist E.P. Wigner discovered in the 1950's that the eigenvalues of such matrices tend to a limiting distribution, the celebrated semicircular law. He used a "heuristic proof" and the convergence is in the sense of expected values. Since then the result has been formally established and refined to its final form we will present in these lectures. For establishing this general semicircular law, we will present two different methods: the moment method and the Stieltjes transform method. Both methods belong to the core basis of tools of the random matrix theory. Finally, a variant of the moment method ("big trace") will be used in the last section to establish the convergence of the largest eigenvalue of a Wigner matrix to rightmost endpoint of the semicircular law.

Lecture 1:	October 28, 2016 (Friday) 3:30 – 5:00pm
Lecture 2:	November 4, 2016 (Friday) 3:30 – 5:00pm

Room 210, Run Run Shaw Bldg., HKU

All are welcome