Free probability theory and random multi-matrix models

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Abstract

We discuss certain aspects of random multi-matrix models: random matrices chosen at random according to a certain unitarily invariant Gibbs measure on the space of $N \times N$ matrices. Thanks to work of Voiculescu, Biane, Guionnet and others, free probability tools can be used to analyze the limiting behavior of such random matrix models. In addition to touching upon a connection between such random matrix models and subfactor theory, we will describe our recent joint work with A. Guionnet on free monotone transport. We will present applications both to random matrix theory and von Neumann algebra theory.