

Eikonal formulation of large dynamical random matrix models

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The standard approach to dynamical random matrix models relies on the description of trajectories of eigenvalues. Using the analogy from optics, based on the duality between the Fermat principle (rays) and the Huygens principle (wavefronts), we formulate the Hamilton-Jacobi dynamics for large random matrix models. The resulting equations describe a broad class of random matrix models in a unified way, including normal (Hermitian or unitary) as well as strictly non-normal dynamics. This formalism applied to Brownian bridge dynamics allows one to calculate the asymptotics of the Harish-Chandra-Itzykson-Zuber integrals. The presentation is partially based on the paper: Jacek Grela, Maciej A. Nowak, and Wojciech Tarnowski, Phys. Rev. E 104, 054111 – Published 15 November 2021