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Network Extreme Eigenvalue - from Multimodal to Scale-free Network

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The extreme eigenvalues of adjacency matrices are important indicators on the influences of topological structures to collective dynamical behavior of complex networks. Recent findings on the ensemble averageability of the extreme eigenvalue further authenticate its sensibility in the study of network dynamics. Here we determine the ensemble average of the extreme eigenvalue and characterize the deviation across the ensemble through the discrete form of random scale-free network. Remarkably, the analytical approximation derived from the discrete form shows significant improvement over the previous results. This has also led us to the same conclusion as [Phys. Rev. Lett. 98, 248701 (2007)] that deviation in the reduced extreme eigenvalues vanishes as the network size grows.

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