## Spectral analysis of critical Erdös-Rényi graphs

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## Abstract

The Erdös-Rényi graph G(N, p) is the simplest model of a random graph, where each edge of the complete graph on N vertices is open with probability p, independently of the others. If  $p = p_N$  is not too small then the degrees of the graph concentrate with high probability and the graph is homogeneous. On the other hand, for p of order  $(\log N)/N$  and smaller, the degrees cease to concentrate and the graph is with high probability inhomogeneous, containing isolated vertices, leaves, hubs, etc. I present results on the eigenvalues and eigenvectors of the adjacency matrix of G(N, p) at and below the critical scale. I show a rigidity estimate for the locations of the eigenvalues and explain a transition from localized to delocalized eigenvectors at a specific location in the spectrum.