Meeting: 1003, Atlanta, Georgia, MORGAN, Morgan Prize Session

1003-05-1164

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Alon and Roichman proved in 1994 that for every $\epsilon > 0$ there is a finite $c(\epsilon)$ such that for any sufficiently large group G, the expected value of the second largest (in absolute value) eigenvalue of the normalized adjacency matrix of the Cayley graph with respect to $c(\epsilon)\log|G|$ random elements is less than ϵ. We reduce the number of elements to $c(\epsilon)\log D(G)$ (for the same c), where $D(G)$ is the sum of the dimensions of the irreducible representations of G. In sufficiently non-abelian families of groups (as measured by these dimensions), e.g., the symmetric and affine groups, $\log D(G)$ is asymptotically $(1/2)\log|G|$. As is well known, a small eigenvalue implies large graph expansion (and conversely). For any specified eigenvalue or expansion, therefore, random Cayley graphs (of sufficiently non-abelian groups) require only half as many edges as was previously known. (Received October 04, 2004)