A Family of Graphs with Maximum Number of Spanning Trees and Most Reliable Graphs

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Consider a graph $G = (V, E)$ composed of the sets V and E of vertices and edges respectively, and obtained from an almost-regular complete multipartite graph $M(a, b) = K_{a,a,\ldots,b,\ldots,b}$ on n vertices, where $0 \leq b - a \leq 1$, by adding a matching to the vertices of G. In this talk we characterize graphs with maximum number of spanning trees (i.e., **t-optimal** graphs) among all simple graphs with e edges and n vertices, $\Omega(n, e)$, where $n = |V|$ and $e = |E|$, and for n suffienctly large. The **All-terminal** reliability of a connected graph G, $R_V(G, \rho)$, where edges fail with equal probability ρ (vertices do not fail), is the probability that the graph remains connected after deletion of the failed edges. The characterization of t-optimal graphs plays an important role pertaning the reliability as if a graph $G = (V, E)$ is t-optimal then it maximizes $R_V(G, \rho)$ in $\Omega(|V|, |E|)$, whenever ρ approaches 1.

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