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The threshold strong dimension of the hypercube

A set W of vertices of a connected graph G is a *strong resolving set* for G if, for every pair of vertices, one of the vertices in the pair lies on a shortest path from the other vertex to some vertex of W. The smallest cardinality of a strong resolving set of vertices of G is the *strong dimension* of G. The strong dimension is a stronger version of the better known metric dimension of a graph. Highly symmetric graphs, such as the incidence graphs of combinatorial designs, tend to have low metric and strong dimension, and much work has been done constructing resolving sets for these graphs using properties of the designs from which they arise. The *threshold strong dimension* of G is the smallest strong dimension among all graphs having G as a spanning subgraph, and it is denoted by $\tau_s(G)$. We present a geometric characterization of $\tau_s(G)$, which expresses $\tau_s(G)$ in terms of the smallest number of paths (each of sufficiently large order) whose strong product admits a certain type of embedding of G. We use this geometric characterization as a tool to bound the threshold strong dimension of the hypercube. This is ongoing joint work with Nadia Benakli, Novi H. Bong, Linda Eroh, Beth Novick, and Ortrud Oellermann.