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On the Addressing Problem

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Let d_G be a distance function on a connected graph G, where $d_G(x, y)$ is the length of smallest path between the nodes x and y in G ($d_G(x, x) = 0$). One may define a distance matrix $D(G)$ by taking $D(G)(x, y) = d_G(x, y)$. An addressing of G of length n is a $|V(G)|$ by n $(-, 0, +)$-matrix M with the following row property:

$$|\{\text{column index } j : M(x, j)M(y, j) = -\}| = d_G(x, y).$$

An addressing M of the smallest length $N = N(G)$ is said to be optimal. The matrix M is called eigensharp if $N(G) = \max\{n_-(G), n_+(G)\}$, where $n_-(G)$ and $n_+(G)$ are the numbers of negative and positive eigenvalues of $D(G)$, respectively.

In this talk we are concerned with optimal addressing and in particular, we precisely determine some conditions on two graphs G and H with eigensharp addressing under which the Cartesian product $G \square H$ has also eigensharp addressing.

Joint work with B. Manoochehrian.