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Orthogonal signed graphs of degrees five and six

A signed graph is orthogonal if the distinct rows of its signed adjacency matrix are pairwise orthogonal. Examples include the signed K_6 associated with the antipodal quotient of the icosahedron, several infinite families of tessellations of the torus, and the two-eigenvalue signed hypercubes used in the resolution of the Sensitivity Conjecture.

In fact, all orthogonal signed graphs must have exactly two distinct (signed adjacency) eigenvalues, so we are dealing with a special case of the two-eigenvalue inverse eigenvalue problem for graphs.

I will discuss the examples and share our recent classification of the 5-regular orthogonal signed graphs. Time permitting, I will discuss partial results in the 6-regular case as well.

Based on joint work with Bojan Mohar and Behruz Tayfeh-Rezaie.