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The strong spectral property for graphs

A symmetric matrix A is said to have the strong spectral property if $X = O$ is the only symmetric matrix satisfying $A \circ X = O$, $I \circ X = O$, and $AX - XA = O$. Here the operation \circ is the entrywise product. If a matrix has the strong spectral property, one may perturb the matrix slightly to create more nonzero entries without changing its spectrum. This behavior has been used widely for constructing matrices in the inverse eigenvalue problem of a graph. In this talk, we show that if the nonzero pattern of the matrix is described by certain graphs, then it always has the strong spectral property.