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Edge perturbations on signed graphs with clusters

Let Γ be a signed graph. A cluster in Γ of order c and degree s, is a pair of vertex subset (C, S), where C is a set of cardinality $c \geq 2$ of pairwise co-neighbor vertices sharing the same set of s neighbors and all edges connecting a fixed vertex in C are equallly signed. We consider the graph $\Gamma(H)$ which is obtained from G by identifying $V(H)$ with C and show that some Laplacian or Adjacency eigenvalues of $\Gamma(H)$ remain the same whatever H we choose in a suitable set of signed graphs.

Such techniques also provide a generalization to signed contexts of the Faria's lower bound on the multiplicity of the Laplacian eigenvalue 1 of a graph with pendant vertices.

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