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*Progress on a characterization of signed graphs  $(G, \Sigma)$  with  $\nu(G, \Sigma) \leq 3$ .*

A signed graph is a pair  $(G, \Sigma)$ , where  $G$  is an undirected graph (we allow parallel edges but no loops) and  $\Sigma \subseteq E(G)$ . The edges in  $\Sigma$  are called odd, while the other edges are called even. If  $(G, \Sigma)$  is a signed graph with vertex-set  $V = \{1, \dots, n\}$ ,  $S(G, \Sigma)$  is the set of all symmetric  $n \times n$  matrices  $A = [a_{i,j}]$  with  $a_{i,j} > 0$  if  $i$  and  $j$  are adjacent and connected by only odd edges,  $a_{i,j} < 0$  if  $i$  and  $j$  are adjacent and connected by only even edges,  $a_{i,j} \in \mathbb{R}$  if  $i$  and  $j$  are adjacent and connected by both even and odd edges,  $a_{i,j} = 0$  if  $i$  and  $j$  are not adjacent, and  $a_{i,i} \in \mathbb{R}$  for all vertices  $i$ . The parameter  $\nu(G, \Sigma)$  is defined as the largest nullity of any positive semidefinite matrix  $A \in S(G, \Sigma)$  satisfying the Strong Arnold Hypothesis. This invariant is closed under taking minors. Arav, Hall, van der Holst, and Li gave a characterization of the class of signed graphs  $(G, \Sigma)$  with  $\nu(G, \Sigma) \leq 2$ . A characterization of the class of signed graphs  $(G, \Sigma)$  with  $\nu(G, \Sigma) \leq 3$  is still open. In this talk, we present some classes of signed graphs  $(G, \Sigma)$  with  $\nu(G, \Sigma) \leq 3$ .

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