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Graph Complement Conjecture for Classes of Shadow Graphs

The real minimum semidefinite rank of a graph G , denoted $mr_+^{\mathbb{R}}(G)$, is the minimum rank among all real symmetric positive semidefinite matrices whose zero/nonzero pattern corresponds to the graph G . The graph complement conjecture, denoted GCC_+ , is the inequality $mr_+^{\mathbb{R}}(G) + mr_+^{\mathbb{R}}(\overline{G}) \leq |G| + 2$. Given a graph G , the shadow graph $S(G)$ is obtained from G by adding for each vertex u of G , a new vertex v , called the shadow vertex of u , and joining v to the neighbors of u in G . Also, a variant of $S(G)$, denoted $\text{Shad}(G)$, will be given. It is shown that $S(G)$ and $\text{Shad}(G)$ satisfies GCC_+ when G is a tree or a unicyclic graph or a complete graph.