Chassidy Bozeman* (bozeman1@stolaf.edu). The tree cover number and positive semidefinite maximum nullity of a graph.

For a simple graph $G = (V, E)$, let $S_+(G)$ denote the set of real positive semidefinite matrices $A = (a_{ij})$ such that $a_{ij} \neq 0$ if $\{i, j\} \in E$ and $a_{ij} = 0$ if $\{i, j\} \notin E$. The maximum positive semidefinite nullity of $G$, denoted $M_+(G)$, is $\max\{\text{nullity}(A) | A \in S_+(G)\}$. A tree cover of $G$ is a collection of vertex-disjoint simple trees occurring as induced subgraphs of $G$ that cover all the vertices of $G$. The tree cover number of $G$, denoted $T(G)$, is the cardinality of a minimum tree cover. It is known that the tree cover number of a graph and the maximum positive semidefinite nullity of a graph are equal for outerplanar graphs, and it was conjectured in 2011 that $T(G) \leq M_+(G)$ for all graphs [Barioli et al., Minimum semidefinite rank of outerplanar graphs and the tree cover number, Elec. J. Lin. Alg., 2011]. We show that the conjecture is true for certain graph families. Furthermore, we prove bounds on $T(G)$ to show that if $G$ is a connected outerplanar graph on $n \geq 2$ vertices, then $M_+(G) = T(G) \leq \left\lceil \frac{n}{2} \right\rceil$, and if $G$ is a connected outerplanar graph on $n \geq 6$ vertices with no three or four cycle, then $M_+(G) = T(G) \leq \frac{n}{3}$. (Received September 25, 2018)