Given a multigraph $G$ on the vertices $\{v_1, \ldots, v_n\}$, in which all edges are multiedges, we associate a set of nonzero vectors $\vec{V} = \{\vec{v}_1, \ldots, \vec{v}_n\}$ in $\mathbb{C}^n$ to the vertices of $G$ in the following manner: If vertices $v_i$ and $v_j$ are not joined then the corresponding vectors $\vec{v}_i$ and $\vec{v}_j$ are orthogonal. The rank of a vector representation $\vec{V}$ is the maximum number of linearly independent vectors in $\vec{V}$. The minimum vector rank of $G$, $\text{mvr}(G)$, is the minimum rank among all vector representations of $G$.

We present methods for determining $\text{mvr}(G)$ if $G$ is among certain classes of graphs, including perfect graphs and cycles. Further, we present upper and lower bounds on $\text{mvr}(G)$ for all multigraphs that contain only multiedges, and provide a conjecture on the exact value of $\text{mvr}(G)$ for such multigraphs. (Received July 28, 2006)