The Gathering Number of a Graph and Vertex Degrees

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Let G be a non-complete, finite simple graph with vertex set $V(G)$. We define the *gathering number* of G, denoted by $g(G)$, to be the minimum value of $|X| - \omega(G - X)$ for all vertex cut-sets $X \subset V(G)$, where $\omega(G - X)$ is the number of components of $\langle G - X \rangle$. Note that $g(G) = -s(G)$, where $s(G)$ is the *scattering number* of G. We discuss the motivation behind the definition of the gathering number, and we provide conditions on the degree sequence of G which imply $g(G) \geq k$ for a fixed integer k, with $-|V(G)| \leq k \leq |V(G)|$. We also indicate specifically how these degree conditions are best possible. These results are part of an undergraduate research project with John Bazaar at the University Park campus of Penn State University.