Zero Forcing Numbers and Graph Powers.

Suppose we have an undirected graph $G = (V(G), E(G))$ where some set of vertices $Z \subset V(G)$ is initially colored black and the rest are colored white. By the color change rule, a white vertex turns black if it is the only white neighbor of a black vertex. If all the vertices eventually turn white, $Z$ is called a zero forcing set of $G$, and the minimum size of $Z$ over all zero forcing sets of $G$ is called the zero forcing number, $Z(G)$. The zero forcing number has been shown to give a bound on the minimum rank of a graph. In this talk, we show that although in general adding edges to a graph might increase or decrease the zero forcing number, taking the power of a graph always increases the zero forcing number, provided the graph is not already complete: $Z(G^k) < Z(G^{k+1})$ if $G^k \neq G^{k+1}$. We also provide a partial generalization of this result to directed graphs. (Received September 22, 2011)