A Family of 4-Critical Graphs with Diameter Three

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Let $\gamma_t(G)$ denote the total domination number of the graph $G$. $G$ is said to be total domination edge critical, or simply $\gamma_t$-critical, if $\gamma_t(G + e) < \gamma_t(G)$ for each edge $e \in E(G)$. In this paper we study a family $\mathcal{H}$ of 4-critical graphs with diameter three, in which every vertex is a diametrical vertex, and every diametrical pair dominates the graph. We also generalize the self-complementary graphs, and show that these graphs provide a special case of the family $\mathcal{H}$.

Keywords: total domination, self-complementary, edge addition critical.