Title: Global signed total domination in graphs

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A function $f : V(G) \rightarrow \{-1, 1\}$ defined on the vertices of a graph $G$ is a signed total dominating function (STDF) if the sum of its function values over any open neighborhood is at least one. A STDF $f$ of $G$ is called a global signed total dominating function (GSTDF) if $f$ is also a STDF of the complement $\overline{G}$ of $G$. The global signed total domination number $\gamma_{gst}(G)$ of $G$ is defined as $\gamma_{gst}(G) = \min\{\sum_{v \in V(G)} f(v) \mid f$ is a GSTDF of $G\}$. In this paper first we find lower and upper bounds for the global signed total domination number of a graph. Then we prove that if $T$ is a tree of order $n \geq 4$ with $\Delta(T) \leq n - 2$, then $\gamma_{gst}(T) \leq \gamma_{st}(T) + 4$. We characterize all the trees which satisfy the equality. We also characterize all trees $T$ of order $n \geq 4$, $\Delta(T) \leq n - 2$ and $\gamma_{gst}(T) = \gamma_{st}(T) + 2$.

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