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On Exponential Domination of Some Graphs

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Abstract: Let G be a graph and $S \subseteq V(G)$. We denote by $\langle S \rangle$ the subgraph of G induced by S. For each vertex $u \in S$ and for each $v \in V(G) - S$, we define $\overline{d}(u,v) = \overline{d}(v,u)$ to be the length of the shortest path in $\langle V(G) - (S - \{u\}) \rangle$ if such a path exists, and ∞ otherwise. Let $v \in V(G)$. We define $w_s(v) = \sum_{u \in S} \frac{1}{2^{\overline{d}(u,v)-1}}$ if $v \notin S$, and $w_s(v) = 2$ if $v \in S$. If, for each $v \in V(G)$, we have $w_s(v) \geq 1$, then S is an *exponential dominating set*. The smallest cardinality of an exponential dominating set is the *exponential domination number* $\gamma_e(G)$. In this paper, we consider the *exponential domination number* in total graphs. We determine the *exponential domination number* of $T(G)$ for some specific graphs G.

Keywords: *graph vulnerability; network design and communication; domination; exponential domination number; total graph.*

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1 Introduction

In a communication network, the vulnerability measures the resistance of network to disruption of operation after the failure of certain stations or communication links. The stability of communication networks is of prime importance to network designers (see [9,10]). If we think of the graph as modeling a communication network, many graph theoretical parameters have been used to describe the stability of communication networks including connectivity, toughness, integrity, domination and its variations (see [1,2,4,5]). The domination number is one of the measures of the graph vulnerability.

Domination in graphs is a well-studied concept in graph theory. Domination based parameters reveal an underlying efficient communication network in which a vertex can

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