

## TWIN MINUS TOTAL DOMINATION NUMBERS IN DIRECTED GRAPHS

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### Abstract

Let  $D = (V, A)$  be a finite simple directed graph (shortly, digraph). A function  $f : V \rightarrow \{-1, 0, 1\}$  is called a twin minus total dominating function (TMTDF) if  $f(N^-(v)) \geq 1$  and  $f(N^+(v)) \geq 1$  for each vertex  $v \in V$ . The twin minus total domination number of  $D$  is  $\gamma_{mt}^*(D) = \min\{w(f) \mid f \text{ is a TMTDF of } D\}$ . In this paper, we initiate the study of twin minus total domination numbers in digraphs and we present some lower bounds for  $\gamma_{mt}^*(D)$  in terms of the order, size and maximum and minimum in-degrees and out-degrees. In addition, we determine the twin minus total domination numbers of some classes of digraphs.

**Keywords:** twin minus total dominating function, twin minus total domination number, directed graph.

**2010 Mathematics Subject Classification:** 05C69.

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Received 18 March 2016

Revised 22 August 2016

Accepted 22 August 2016