EDGE-RUPTURE DEGREE OF A GRAPH

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Abstract. The edge-rupture degree of a noncomplete connected graph G is defined to be $r'(G) = max\{\omega(G - S) - |S| - m(G - S) : S \subseteq E(G), \omega(G - S) > 1\}$ where $\omega(G - S)$ denote the number of components and $m(G - S)$ denote the order of a largest component in $G - S$. In this paper, the relations between edge-rupture degree and other parameters are determined, and the edge-rupture degree of some graphs are obtained.

Keywords. Networks; Graph Theory; Connectivity; Rupture Degree; Edge rupture Degree.

AMS (MOS) subject classification: 05C40, 68R10, 68M10

1 Introduction

Graphs are often used to model real world problems, such as problem in a communication network. In a communication network, the vulnerability measures the resistance of the network to disruption of operation after the failure of certain stations or communication links. The analysis of vulnerability in networks generally involves some questions about how the underlying graph is connected. When some edges of a graph are deleted, one wants to know whether the remaining graph is still connected. Moreover if the graph is disconnected, the number of vertices of components is useful. Based on these questions, a number of graph parameters, such as connectivity [6] and edge-connectivity [7], integrity [4] and edge-integrity [4], toughness [8] and edge-toughness [9], tenacity [10] and edge-tenacity [22], rupture degree [20] and edge-rupture degree [13] have been proposed for measuring the vulnerability of networks.

The concept of graph rupture degree was introduced by Li, Zhang, and Li [20], as a measure of network vulnerability and reliability. Conceptually graph vulnerability relates to the study of graph intactness when some of its elements are removed. The motivation for studying vulnerability measures is derived from design and analysis of networks under hostile environment. Rupture degree has been an active area of research since the the concept was introduced in 2005.