# Rupture Degree of Complete $k$-Ary Trees

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(joint work with Alpay Kirlangic)

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. If we think of a graph as modelling a network, then many graph theoretical parameters such as connectivity, integrity, scattering number, toughness, tenacity and their edge-analogues, have been defined to measure the vulnerability of networks. The *rupture degree* is a new graph vulnerability parameter and it was introduced by Yinkui Li, Shenggui Zhang and Xueliang Li. Formally, the *rupture degree* of a non-complete connected graph $G$ is defined by

$$r(G) = \max\{w(G - S) - |S| - m(G - S) : S \subset V(G), w(G - S) > 1\},$$

where $w(G - S)$ is the number of components of $G - S$ and $m(G - S)$ is the order of a largest component of $G - S$. Zhang *et al.* show that the rupture degree is a better measure of vulnerability than the other parameters.

In this paper, we improve the result for the rupture degree of the complete binary trees of depth $d$ given by Rajasingh *et al.* and prove their conjecture. And also we give a general formula for the rupture degree of complete $k$-ary trees and rupture degree of composition of two complete binary trees.

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