j-Multiple, k-Component Order Neighbor Connectivity: An Extension of Multiple Domination

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The vulnerability parameter k-component order neighbor connectivity is defined as the minimum number of closed neighborhoods that must be removed from a graph in order to ensure that all remaining components have order less than some given threshold value, k. Consider a network modeled by a graph G on n nodes and e edges. We observe that the problem of computing the k-component order neighbor connectivity of a network modeled by an arbitrary graph G for arbitrary k is NP-hard since $k = 1$ coincides with the domination number of G. The parameter j-multiple, k-component order neighbor connectivity, denoted $\kappa^{(k)}_{nc,j}(G)$, is an extension of k-component order neighbor connectivity that also requires every node adjacent to the failure set be adjacent to at least j nodes from it. Similarly, when k is 1, this new parameter is equivalent to a j-dominating set. This parameter is considered to be an exceptional invariant, meaning that the removal of a single node from an arbitrary graph G can either increase or decrease the parameter. In this talk, I will not only introduce this new parameter, but present results for several well known graphs and dive into its stability.

Keywords: multiple domination, k-component order neighbor connectivity, network vulnerability, domination alteration