

Proper Diameter of Graphs

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In recent times, the notion of connectedness in graphs has been generalized to edge-colored graphs. An edge-colored graph is *properly connected* if there exists a properly colored path for every pair of vertices in the graph. Note that a path is properly colored if consecutive edges have distinct colors. In a similar fashion, we generalize the concept of diameter to edge-colored graphs, and to do so, we introduce the concept of proper diameter. The *proper diameter* of a properly connected edge-colored graph G is the maximum length of all shortest properly colored paths between any pair of vertices in G . The difference between the diameter of G and the proper diameter of G varies depending on the coloring of G . We explore this difference for various graph families including cycles, fans, and complete bipartite graphs.