Rainbow Connectivity and Proper Rainbow Connectivity

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A connected graph G is rainbow connected with respect to an edge coloring of G if each pair of distinct vertices of G are joined by a rainbow path—a path with no color appearing on more than one edge of the path. G is strongly rainbow connected if each pair of distinct vertices of G are joined by a rainbow geodesic, a shortest path in G between the vertices. The (strong) rainbow connection number of G, denoted (s)rc(G), is the smallest number of colors in an edge coloring of G with respect to which G is (strongly) rainbow connected.

We consider two recently introduced parameters, prc and psrc, defined as rc and src were, with the additional requirement that the edge colorings be proper. We mention some relations among the 4 parameters and evaluate them on some classes of graphs, including some of the theta graphs.