GENERALIZED RAINBOW CONNECTION OF GRAPHS
AND THEIR COMPLEMENTS

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Abstract

Let G be an edge-colored connected graph. A path P in G is called ℓ-rainbow if each subpath of length at most ℓ + 1 is rainbow. The graph G is called (k, ℓ)-rainbow connected if there is an edge-coloring such that every pair of distinct vertices of G is connected by k pairwise internally vertex-disjoint ℓ-rainbow paths in G. The minimum number of colors needed to make G (k, ℓ)-rainbow connected is called the (k, ℓ)-rainbow connection number of G and denoted by rc_{k,ℓ}(G). In this paper, we first focus on the (1, 2)-rainbow connection number of G depending on some constraints of G. Then, we characterize the graphs of order n with (1, 2)-rainbow connection number n − 1 or n − 2. Using this result, we investigate the Nordhaus-Gaddum-Type problem of (1, 2)-rainbow connection number and prove that rc_{1,2}(G) + rc_{1,2}(\overline{G}) ≤ n + 2 for connected graphs G and \overline{G}. The equality holds if and only if G or \overline{G} is isomorphic to a double star.

Keywords: ℓ-rainbow path, (k, ℓ)-rainbow connected, (k, ℓ)-rainbow connection number.

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References


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