Rainbow structures in a collection of graphs with degree conditions

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Abstract

Let $\mathbf{G} = \{G_1, \ldots, G_s\}$ be a collection of not necessarily distinct n-vertex graphs with the same vertex set V. We use $\mathbf{G}$ to denote an edge-colored multigraph of $\mathbf{G}$ with $V(\mathbf{G}) = V$ and $E(\mathbf{G})$ a multiset consisting of $E(G_1), \ldots, E(G_s)$, and the edge e of $\mathbf{G}$ is colored by i if $e \in E(G_i)$. A graph H is *rainbow* in $\mathbf{G}$ if any two edges of H belong to different graphs of $\mathbf{G}$. We say that $\mathbf{G}$ is *rainbow vertex-pancyclic* if each vertex of V is contained in a rainbow cycle of $\mathbf{G}$ with length ℓ for every integer $\ell \in [3, n]$, and that $\mathbf{G}$ is *rainbow panconnected* if for any pair of vertices u and v of V there exists a rainbow path of $\mathbf{G}$ with length ℓ joining u and v for every integer $\ell \in [d_{\mathbf{G}}(u, v), n-1]$.

In this talk, we study the existences of rainbow spanning trees and rainbow Hamiltonian paths in $\mathbf{G}$ under the Ore-type conditions. Moreover, we study the rainbow vertex-pancyclicity and rainbow panconnectedness, as well as the existence of rainbow cliques in $\mathbf{G}$ under the Dirac-type conditions. We also give some examples to show the sharpness of our results. This is joint work with Ping Li and Xueliang Li.

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