2-Disjoint Geodesic Bipancyclicity of Hypercubes

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ABSTRACT

Let \( G = (V, E) \) be a graph. For any two vertices \( u, v \in V(G) \), a cycle \( C \) is called \((u,v)\)-geodesic if there exists a \( u-v \) shortest path of \( G \) lying on \( C \). A bipartite graph \( G \) is called geodesic bipancyclic if for any two vertices \( u, v \in V \), there exists a \((u,v)\)-geodesic cycle of every even length ranging from \( \max\{2d(u, v), 4\} \) to \( |V| \). In this thesis, we first show that the hypercube \( Q_n \) for \( n \leq 4 \) is geodesic bipancyclic when it has two adjacent fault vertices. Then we prove that \( Q_n \) is 2-disjoint geodesic bipancyclicity for \( n \leq 4 \). That is, given any four vertices \( u, v, x, y \) without forming \( u, x, v, y \) \( u, x, v, y \), \( u, y, v, y \) paths, and given any even integers \( l_1, l_2 \) such that \( l_1 + l_2 \leq 2n \), \( l_1 \leq \min\{2d(u, v) + 2, 2n\} \), and \( l_2 \leq \min\{2d(x, y) + 2, 2n\} \), there exist two disjoint cycles \( C_1 \) and \( C_2 \) in \( Q_n \) such that \( C_1 \) is a \((u,v)\)-geodesic cycle of length \( l_1 \), and \( C_2 \) is a \((x,y)\)-geodesic cycle of length \( l_2 \).

Keywords : Geodesic Bipancyclic、2–Disjoint Geodesic Bipancyclicity、Hypercube

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