Algebraic Constructions of Orthogonal Double Covers of K_n

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Abstract

An *Orthogonal Double Cover*, or ODC, of a complete graph K_n by a graph G is a collection $\mathcal{C} = \{G_1, \ldots, G_n\}$ of subgraphs of K_n, each isomorhpic to G, such that (1) Each edge of K_n appears in exactly two members of $\mathcal{C}$ and (2) Any two different members of $\mathcal{C}$ have exactly one edge in common. It has been conjectured that for any tree T on n vertices, except for the path on four vertices, there exists an ODC of K_n by T. We present an algebraic construction using nilpotent maps which yields many families of ODCs of K_n by various trees, and discuss the limitations of the algebraic approach to constructing ODCs.