

Covering Arrays on Product Graphs

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Two vectors x, y in \mathbb{Z}_g^n are *qualitatively independent* if for all pairs $(a, b) \in \mathbb{Z}_g \times \mathbb{Z}_g$, there exists $i \in \{1, 2, \dots, n\}$ such that $(x_i, y_i) = (a, b)$. A covering array on a graph G , denoted by $CA(n, G, g)$, is a $|V(G)| \times n$ array on \mathbb{Z}_g with the property that any two rows which correspond to adjacent vertices in G are qualitatively independent. The number of columns in such array is called its *size*. Given a graph G , a covering array on G with minimum size is called *optimal*. Our primary concern in this paper is with constructions that make optimal covering arrays on large graphs those are obtained from product of smaller graphs. We find families of graphs for which the size of covering array on the Cartesian product achieves the lower bound.

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