Abstract

A generalization of difference matrices and its applications to graph decompositions

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Given an additive group G and a graph Γ with vertex-set $V(\Gamma) = \{x_1, x_2, ..., x_k\}$, we define a (G, Γ, λ)-*difference matrix* to be a $(k \times \lambda|G|)$-matrix M with entries from G such that if $[x_i, x_j] \in E(\Gamma)$, then the difference between the i-th and j-th row of M contains each element of G exactly λ times.

This is a generalization of the well known concept of a (G, k, λ)-difference matrix that, obviously, can be viewed as a (G, Γ, λ)-difference matrix where Γ is the complete graph on k vertices.

We show how our generalization is useful in the recursive construction for graph decompositions admitting a sharply vertex transitive automorphism group.