

# $\Gamma$ -graphic delta-matroids and their applications

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## Abstract

For an abelian group  $\Gamma$ , a  $\Gamma$ -labelled graph is a graph whose vertices are labelled by elements of  $\Gamma$ . We prove that a certain collection of edge sets of a  $\Gamma$ -labelled graph forms a delta-matroid, which we call a  $\Gamma$ -*graphic* delta-matroid, and provide a polynomial-time algorithm to solve the separation problem, which allows us to apply the symmetric greedy algorithm of Bouchet to find a maximum weight feasible set in such a delta-matroid. We present two algorithmic applications on graphs; MAXIMUM WEIGHT PACKING OF TREES OF ORDER NOT DIVISIBLE BY  $k$  and MAXIMUM WEIGHT  $S$ -TREE PACKING. We also discuss various properties of  $\Gamma$ -graphic delta-matroids.

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