On the Generalized Minimum Spanning Tree Problem: Problem Formulations and Complexity

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ABSTRACT: *This paper considers the Generalized Minimum Spanning Tree Problem (GMSTP). Given an undirected graph whose nodes are partitioned into mutually exclusive and exhaustive node sets, the GMSTP is then to find a minimum cost tree which includes exactly one node from each node set. Here we show that the GMSTP is NP-hard and that unless P=NP, no polynomial-time heuristic algorithm with a finite worst-case performance ratio can exist for the GMSTP. We present various integer programming formulations for the problem and compare their linear programming relaxations.*