1125-05-2396 **Jonathan Bloom** and **Carl Hammarsten*** (hammarsc@lafayette.edu). *An algorithm toward finding solutions to the general multi-constraint cable-trench problem.*

Given a weighted graph, a classic problem in graph theory involves finding spanning trees whose edge weights minimize certain constraints. Two particularly well-known versions of this problem are the shortest-path tree (SPT) and the minimal spanning tree (MST). In both of these cases, there exist efficient algorithms to construct solutions - Dijkstra's algorithm for the former and Prim's algorithm for the latter.

The cable-trench problem may be thought of as an interpolation between the SPT and the MST. Namely, the constraint we minimize is a weighted sum of the constraints for the two previous cases.

We present an algorithm which aims to find a solution to the cable-trench problem via modifying a candidate solution tree by studying local costs associated to each edge and determining where improvements can be made. We present empirical evidence that our algorithm solves the problem for many graphs and a large variety of edge weights. We will also show that our algorithm naturally addresses the situation where the edge weights used for the SPT and the those used for the MST need not be directly related (general cable-trench) and our algorithm is easily modifiable to address the situation when more than two constraints are combined (multi-constraint cable-trench). (Received September 20, 2016)