

<p>A Multi-Commodity Network Flow Problem with Application to the Network Equilibrium Problem</p>

Abstract

This paper develops a solution technique for large scale minimum cost network flow problems with nonlinear costs. The network equilibrium problem is described and is shown to be a special case of the ^{general} problem. It is shown that this nonlinear network problem can be solved without explicitly considering any of the constraints--they are satisfied automatically in the procedure developed--and without even storing all of the individual decision variables. Remarkably, the computational requirements of the algorithm reported are almost identical to the requirements of heuristic solution techniques for the network equilibrium problem. A solution time of nine seconds on the CDC 6400 is reported for this nonlinear programming problem with 1,824 variables and non-negativity constraints and 552 conservation of flow, constraints.