

Uncapacitated minimum cost flow problems in a distribution network

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In this thesis, we consider three special minimum cost flow problems in a distribution network, a kind of manufacturing network recently introduced by Fang and Qi. The network differs from a traditional network model because a new kind of nodes, called D-nodes, are incorporated to describe a distilling operation that decomposes one raw-material to several products with fixed ratios. Besides, all the arcs in our models have no upper bounds. We treat these uncapacitated minimum cost flow problems as specialized shortest path problems with side constraints in a distribution network. We give a preprocessing that compacts a distribution network to an equivalent network of smaller size, derive their mathematical formulations and develop efficient solution methods.

Keywords : Manufacturing network, distribution network, minimum cost flow problem, uncapacitated, shortest path