

TECHNOLOGY FOR SOLVING ROUTING PROBLEMS UNDER UNCERTAINTY

Sira O. V., Sinitsyn R. S., Riabokon R. M.

National Technical University «Kharkiv Polytechnic Institute», Kharkiv

The traditional problem of managing transportation in “supplier–consumer” logistics systems is typically solved using standard linear programming methods. However, under the assumption of stochastic transportation costs, the application of this method becomes impossible. As an alternative, the technology of continuous linear programming [1] is proposed. This algorithm is implemented through an iterative procedure of successive improvement of the transportation plan. A method that reduces the procedure to a quadratic one is proposed. The resulting problem can be solved using well-known methods. Moreover, the original task is significantly extended to account for a practically important situation, where due to a small sample size of initial data, it is not possible to obtain sufficiently accurate analytical descriptions of the probability density functions of stochastic transportation costs. In this case, the available statistical data volume is only sufficient for estimating the first two moments of the unknown density functions.

To solve the problem under these circumstances, a minimax method for finding the transportation plan is proposed. The computational procedure consists of two steps. First, the problem is solved for the worst-case density distribution with known values of the first two moments. Then, in the second step, the best transportation plan is found. To identify such density functions, the mathematical apparatus of continuous linear programming is used. The direction for further research: consideration of the problem when the initial data are defined fuzzily [2].

Keywords: multidimensional routing problem, approximate algorithm, continuous linear programming.

References (translated):

1. Raskin L.G., Kirichenko I.O., Sira O.V. Applied Continuum Liner Programming. – Kh., 2014.-292 p.
2. Lev Raskin, Oksana Sira. PERFORMING ARITHMETIC OPERATIONS OVER THE (L–R)-TYPE FUZZY NUMBERS// Eastern-European Journal of Enterprise Technologies. – 2020. – Vol. 3, Issue 4. – P. 6-11. DOI: 10.15587/1729-4061.2020.203590