Network Programming Method in Problems of Discrete Optimization

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Problems of nonlinear optimisation (in particular, discrete optimisation) belong to the class of so-called NP-difficult problems for which there are no effective methods of the exact decision.

In 2004 V.N.Burkov and I.V.Burkova had been offered the new approach to the decision of problems of discrete optimisation in which basis possibility of submission of function in the form of superposition of more simple functions lies. Such superposition it is convenient to represent in the form of a network which inputs correspond to variables, intermediate tops – to the functions entering into superposition, and in final top the significance of function is calculated. Because of such submission the method has received the name of a method network [2] (in that specific case, dichotomizing) programming. This method is applicable in cases when criterion function and functions-restrictions have identical structures of network submissions. Then in each top of network submission optimisation problems, more simple, than initial are solved. The task solution in final top gives top (or bottom) an estimation (and provided that the structure of network submission is a tree, – the exact decision) an initial problem. Special case of this method is the method of a dynamic programming of Bellman (structure of network submission – a tree branch). A number of problems for which a dynamic programming method is inapplicable, decided by a network programming method.

In the talk the network programming method is applied to problems of nonlinear programming. The concept of the dual problem, one of admissible is entered (but generally not optimum) which decisions gives a method of multipliers of Lagrange. It is proved that the dual problem is a convex programming problem. Necessary and sufficient optimality conditions for a dual problem of integer linear programming are received.

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