

Optimal Resource Allocation in a Large Scale System Under Soft Constraints.

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Abstract: In the paper there is discussed a problem of the resource allocation in a large scale system in the presence of the resource shortages. The control task is divided into two levels, with the coordinator on the upper level and local controllers on the lower one.

It is assumed that they have different information. The coordinator has an information on mean values of users demands, an inflow forecast and an estimation of the resource amount in a storage reservoir. On the basis on this information it determines (by a numerical way) values of a coordinating variable transmitted to the local controllers. The i th local controller receives the measurement of the i th user demand and the value of the coordinating variable from the coordinator. On the basis on this information it calculates the decision on the resource allocation.

For a coordination an isoperimetric constraint is proposed. Due to this, the lower level optimization problem consists in independent local tasks which depend on the coordinating variable.

In the paper two strategies of the coordinator are proposed. The first algorithm is based on the open-loop feedback strategy, while the second one takes into account probabilistic constraints on the aggregate variable and on the amount of the resource in a storage reservoir.

For static, scalar subsystems and a quadratic performance index some properties of an obtained solution are discussed.

Keywords:

AMS Subject Classification: 93C;