AN APPROACH FOR SYNTHESIS OF COMPLEX HIERARCHICAL SYSTEMS

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The paper is concerned with problems of synthesis of complex hierarchical systems. A control system for large production unit is considered. Notions of system structure, system process functioning and structural stability are introduced. The following stages of system synthesis are discussed:

1. Defining of system levels and subsystems by functional decomposition.
2. Determination of interactions between the subsystems and forming of two-level modules on the base of "degree of interaction" factors; the latter can be defined by the discriminator method.
3. Estimation of system structural stability (i.e. estimation of the choice of the coordinator at the supremal level); this estimation is made for each two-level module by one of the coordination methods.
4. Consideration of the system process functioning as a queuing process. A simulation model of the system is developed on the base of which selection of a range of functional and technical system characteristics could be made. For the simulation GPSS/360 program is used.

Usually the realization of the stages 1—4 results in several structural variants of the system and one from them could be chosen (on cost criterion, i.e.).

The proposed approach for synthesis of complex system structure leads to satisfied variant only and not to optimal one. But in most cases of practical systems such structures are sufficiently available.