Methods and Software for Parameter Optimization of Heat Supply Systems

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This paper presents new methods and software system SOSNA intended for the parameter optimization of multi-circuit heat supply systems. They make it possible to calculate large-scale systems which have a complex structure with any set of nodes, sections, and circuits. The research is based on the theory of hydraulic circuits which provides universal methods of mathematical modeling and optimization of heat, water, oil and gas supply systems.

A new methodological approach to solving the problem of the parameter optimization of the multi-circuit heat supply systems is developed [1]. The approach is based on the multi-level decomposition of the network model, which allows us to proceed from the initial problem to less complex sub-problems of a smaller dimension. New algorithms for numerically solving the parameter optimization problems of multi-circuit heat supply systems are developed [2]: 1) an effective algorithm based on the multi-circuit optimization method, which allows us to consider hierarchical creation of the network model in the course of problem solving; 2) a parallel high-speed algorithm based on the dynamic programming method.

The new methods and algorithms were used in the software system SOSNA (in Russian this abbreviation means "Synthesis of Optimal Systems with Due Regard for the Reliability"). The expandable architecture of the software system allows the construction of a flexible adaptive model for controlling computational process. Its presentation in the form of software components makes it universal and permits the repeated use of these components in various software applications when solving the problems of heat supply systems design.

References

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