

## **DIRECTIONS FOR IMPROVEMENT OF APPROACHES, METHODS AND MODELS FOR THE SYNTHESIS OF DECISION-MAKING SUPPORT SYSTEMS AT THE STAGES OF THE LIFE CYCLE OF NPP AND TPP UNITS**

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The main directions of the development of theoretical bases, approaches, methods and models used for the synthesis of automated intellectual decision-making support systems by researchers, designers and operational personnel of NPP and TPP units are based on the following scientific principles and methods:

– significant improvement of imitation models of NPP and TPP units, their individual elements, structures and equipment is possible on the basis of the use of the principle of structural display of hierarchical subordination of the simulated objects by oriented graphs. In this approach, the completeness of the mathematical description of power units is achieved by a multi-level hierarchical view, and the simulation model is formulated in such terms as block, object, object attribute, object operation scheme. It allows to optimize the system of mathematical relations describing various indicators of the operation quality of power units and technological processes in them, methods of diagnostics and prediction of equipment state in the form of subordinate logic-numerical operators. This principle of modeling increases the adequacy and reliability of simulation models at different levels of power unit detailing, simplifies the organization of internal and external management of models and enables to develop an effective overall structure of computer-integrated components of ADMSS;

– significant increase in the reliability of solving problems of determining the properties of structural materials of nuclear and thermal power units, as well as optimization of their parameters, energy characteristics, indicators (including strength and safety) and operation modes at the stages of research, design and maintenance is possible on the basis of the use of the theory and methods of interval (polyinterval) analysis and static theory of testing alternative hypotheses. This is because such complex technical systems, as NPP and TPP power units and their elements, should be considered and modeled at the above stages of life cycle as the systems with incomplete information about their parameters in the conditions of uncertainty and inaccuracy of data. The factors of uncertainty are randomness, ignorance, non-uniformity of possible solutions, variability of variables, semantic uncertainty of goals, instructions and estimates of experts, their multicriteria character at optimization, inaccuracy of mathematical and physical modeling methods, etc. Methods and operations of interval (polyinterval) analysis are one of the effective means of taking into account uncertainty, that enable to solve methodological problems that arise as a result of uncertainty and inaccuracy of data (information) in solving a wide range of tasks at the stages of research, design and operation. The implementation of these methods in ADMSS at their synthesis for the use at life cycle stages will significantly increase the reliability of conclusions when making decisions by relevant persons and, thus, increase the overall level of efficiency, reliability and safety of the operation of NPP and TPP units.