

METHODS OF SYNTHESIS OF INTELLIGENT AUTOMATIC CONTROL SYSTEMS FOR POWER UNITS OF ELECTRIC POWER PLANTS

d-r of tech. sciences, professor V.P. Severin, d-r of tech. sciences, professor, postgraduate A.Y. Usyk, NTU "KhPI", Kharkiv

Automatic control systems (ACS) of power units of nuclear power plants (NPPs) are complex dynamic systems of high order. The main task in designing any such system is to find an optimal balance between the quality of its operation and the degree of its complexity, since the complexity of the system always limits the achievement of the desired quality [1]. The increasing level of requirements to ACS of power units leads to the necessity of further improvement of their design and research methods.

At development of methods of synthesis of ACS for NPP power unit it is necessary to take into account the requirements to the quality of ACS operation under various input influences. These requirements are usually defined as permissible deviations of controlled parameters from their nominal values and as restrictions on the rate of change of these deviations in time. The quality of ACS operation is evaluated on the basis of transient characteristics at standard input signals and influences [2].

The methods of synthesis of ACS directly depend on the requirements imposed on them, which determines the choice of system quality criteria. There are many approaches to the synthesis of ACS. For NPP power units, a promising direction is the use of ACS based on artificial intelligence - fuzzy logic and artificial neural networks [3]. The methods of synthesis of such ACS require further development and research.

References: 1. *Jafari H. S. M., Severin V. P.* Optimal synthesis of intelligent control systems of atomic power station using genetic algorithms // Intelligent Information and Engineering Systems. International Book Series "Information Science and Computing", Supplement to the International Journal "Information Technologies and Knowledge". – 2009. – Number 13. Volume 3. – Rzeszow, Poland – Sofia, Bulgaria: ITHEA. – P. 98–105. 2. *Jafari H. S. M., Severin V. P.* Multicriterion synthesis of intelligent control systems of generating unit of nuclear power station // International Journal of Industrial Engineering & Production Research. – 2014. – Vol. 25. – No. 3. – P. 243-255. 3. *Usyk A. Y., Severin V. P.* Technology of optimal synthesis of intelligent information control systems // Information technology: science, engineering, technology, education, health: Abstracts of the XXX International Scientific and Practical Conference MicroCAD-2023, 17-20 May 2023 – Kharkiv, NTU "KhPI" – 2023. – P. 1058.