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LABORATORY BENCH to ANALYZE of AUTOMATIC CONTROL SYSTEM with A FUZZY CONTROLLER

Currently, there are a large number of automation objects in industry, the management of which by traditional methods is impossible due to insufficient information in terms of their properties, useful signals and noise acting on them. The presence of uncertain or fuzzy information leads to the fact that traditional quantitative methods used in the theory of automatic control are not effective enough [1]. As a result, difficulties arise in the identification of the automation object and the formation of control algorithms for them. One of the ways to overcome these difficulties is to use fuzzy concepts and knowledge, conduct operations using fuzzy logical rules and obtain fuzzy conclusions based on them that allow to generate sequences of actions on a managed object [2].

In the scientific literature, much attention is paid to the mathematical and physical modelling of control systems with a fuzzy controller or control algorithm. In [3] were studied fuzzy control structures for nonlinear objects of various physical nature in the SIMULINK MATLAB environment. As a result of computational experiments was shown a control efficiency. However, there is no information on the relationship between the values that determine the effectiveness of control, and the values that characterize the features of the control actions. This complicates the choice of technical means for the implementation of control systems, as well as the organization of interaction of control tasks with other tasks that can be solved using the selected computing system.

In [4] were performed a physical modelling of control systems with a fuzzy controller. However, the lack of a human-machine interface with the possibility of operational influence on the conditions of the experiment and visualization of changes in input and output values in a convenient form for the researcher in the on-line mode complicates the conduct of wider and deeper studies. In addition, these physical models cannot be used as laboratory stands for the training of qualified personnel who possess modern knowledge and practical skills in the synthesis and analysis of automatic control systems (ACS) for various purposes, including the management of automation objects.

Nowadays, the laboratory base of scientific and educational institutions is being updated with the use of technical products of world famous companies such as: Siemens, ABB, Moeller, Shneiderelectric [5]. The use of modern devices allows you to create effective laboratory and diagnostic stands for solving the problems of preparing future competitive engineers in the field of automation and for solving the problems of testing of modern technological process control systems. However, laboratories created in this way have disadvantages - low adaptation to the research and lack of methodological support.

References

1. Chakraborty J, Jayanthi T, Satya Murty, SAV, Thirugnanamurthy, D, Swaminathan, P. Fuzzy logic based feed water flow control model for prototype fast breeder reactor. 2011 3rd IEEE International Conference on Computer Modeling and Simulation (ICCMS 2011): Conference Paper. Mumbai, 2011.

2. Dubovoi VM, Kvietnyi RN, Mykhaliov OI, Usov AV. Modeling and optimization of systems: Textbook. Vinnytsia: TD “Edelweiss” Ltd.; 2017.

3. Solanke DR, Chinchkhede KD, Manwar AB. Design & Implementation of Fuzzy Inference System For Automatic Braking System. International journal of Reseach in Science and Engineering 2017; 6(9): 1242-1255.

4. Singhala P, Shah DN, Patel B. Temperature Control using Fuzzy Logic. International Journal of Instrumentation and Control Systems 2014; Vol.4. # 1: 1-10. https://doi.org/10.5121 / ijics.2014.4101.

5. Pritchenko OV. The concept of the incentives of small-sized laboratory stands. Electromechanical and saving up systems. Quarterly scientific production journal. 2010; 2(10): 56-61. Kremenchuk: KSU.