About the Creation of the Bank of Objects Models for the Comparation of Methods for the Design of Controllers: Scalar Case

D.S. SALENKO, N.A. MALISHKIN, L.V. DIMITROV

Abstract: The objectives of designing of closed dynamical systems are extremely relevant. The main goal of it is the calculation of the controller (regulator). The theory of automatic (feedback) control is engaged in the development of methods for solving such problems for different kinds of objects. The most publications devoted to some methods and (or) its development gives examples of the application of these methods or techniques. It is expected that these examples convince the reader of the efficacy of the proposed methods or modifications thereof. However, the reader does not receive a valid basis for comparison of these methods, since it can be done only when considering the results of solutions to the same problem in different ways. In addition, we should not lose sight of the fact that the methods that are effective for some types of objects can be ineffective or even inapplicable to other types of objects. Therefore, it is advisable to create a "bank of examples" of models of objects, for which the problem to design the controller is non-trivial. Also classification and (or) the method of examples referring to different classes is necessary, in particular, at least to a class of objects for which the design of the controller is trivial, and object class for which the solution of this problem is very problematic. This paper compares different examples of control objects from the perspective of the complexity or simplicity of controls design for them. It gives the basic principles for classification of objects by the example of the single-channel case.

Key words: control, feedback, automation, regulator, controller, quality of control, accuracy, optimization, simulation

REFERENCES

[1] Zhmud V.A. Simulation study and optimization of locked systems of automatic control. Monograph. Novosibirsk, Publishing House of the NSTU, 2012. - 335 p.

[2] V. A. Zhmud. The Use of the Feedback Control Systems in Laser Physics Researching Experiments. // Proceedings of RFBR and DST Sponsored "The 2-nd Russian-Indian Joint Workshop on Computational Intelligence and Modern Heuristics in Automation and Robotics", 10–13 September, 2011, Additional volume, pp.40–43.

[3] Nusret Tan, Derek P. Atherton. Design of PI and PID controllers. International Journal of Systems Science. Vol.37, No. 8, June 2006. p. 543–554.

[4] Zhmud V.A., Zavorin A.N. Method of designing energy-efficient regulators for complex objects with partially unknown model. Proc.: The control and modeling in complex systems. Proceedings of the XVI International Conference June 30-July 3, 2014, Samara. Russia. p. 557-567.

[5] The modeling tests of the new PID-regulators structures. Voevoda, A.A., Zhmud, V.A., Ishimtsev, R.Y., Semibalamut, V.M. 2009. Proceedings of the IASTED International Conference on Applied Simulation and Modelling, ASM 2009. P.165 – 168.

[6] Modern key technologies in automatics: Structures and numerical optimization of regulators. Zhmud, V., Yadrishnikov, O., Poloshchuk, A., Zavorin, A. 2012. Proceedings - 2012 7th International Forum on Strategic Technology, IFOST 2012.

[7] The design of the feedback systems by means of the modeling and optimization in the program VisSim 5.0/6. Zhmud, V., Liapidevskiy, A., Prokhorenko, E. 2010. Proceedings of the IASTED International Conference on Modelling, Identification and Control. PP. 27–32.

[8] V. Zhmud, O. Yadrishnikov. Numerical optimization of PID-regulators using the improper moving detector in cost function. Proceedings of the 8-th International Forum on Strategic Technology 2013 (IFOST-2013), vol. II, 28 June – 1 July. Mongolian University of Science and Technology, Ulaanbaator, Mongolia. IEEE organized. 2013. P. 265 – 270. http://www.must.edu.mn/IFOST2013/

[9] V. Zhmud, A. Polishchuk, A. Voevoda, R. V. Rao. The Tuning of the PID-Regulator for Automatic Control System of Thermo Energetic Equipment // Proceedings of the Fifth International Conference on Advances in Mechanical Engineering (ICAME-2011), June 06-08, 2011. Surat – 395 007, Gujarat, India. pp. 254-263.

[10] Zhmud V.A., Zavorin A.N. Metodi di ottimizzazione del controllo numerico su una modelli troncati. Italian Science Review. 2014; 4(13). PP. 686-689. Available at URL: http://www.ias-journal.org/archive/2014/april/Zhmud.pdf and http://www.ias-journal.org/archives/april-2014

To get the full text of the article in English, please contact us by e-mail oao_nips@bk.ru