## THE OPTIMAL CONTROLLER SETTINGS SEARCH ON THE BASIS OF QUADRATIC OPTIMIZATION FUNCTION

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Modern technological processes are complex control objects. Thanks to the optimal controller settings, automation systems will ensure the maximum possible, in a given technology condition, product quality and minimum production costs at a given production volume. Determination of the optimal process control settings by conducting the experiment at the site may lead to the loss of finished products quality, raw materials and catalysts

deterioration, and even to the disaster situations, including fires, explosions and harmful substances environmental emissions. Therefore, the development of theoretical methods for the optimal controller settings calculations is a very important and urgent task.

The aim of this work is the development of an algorithm for optimal controller settings search on the basis of integral quadratic optimization function and comparing it with the other methods.

The task of this work is the selection of an optimization function; the choice of the hill-climbing method; the development and software implementation of the controller settings search algorithm; the definition of quality indicators of the studied systems transients; the comparative analysis of the controller settings methods search.

The subject of this research is the single-loop automatic control system (ACS), and the object of the research is the optimal controller setting parameters and transients quality indicators.

The research method is the theoretical one with the computer use. The algorithm of the optimal controller setting parameters calculation has been implemented with the aid of the "Maple" software package.

Для пошуку екстремуму оптимізаційної функції використано метод градієнту, що дало змогу достатньо просто реалізувати пошук екстремуму оптимізаційної функції програмним шляхом. З'ясовано, що достатня кількість ітерацій, при якої зміна оптимізаційної функції не перебільшує 5%, дорівнює п'яти.

The gradient method has been used for an optimization function extremum seeking, which has given an opportunity to implement an optimization function extremum seeking by the software. A sufficient number of iterations at which the optimization function variation is less than 5% has been found to be equal to five.

The research results demonstrate the improvement of the system dynamic properties when using the controller parameters calculated by the proposed method: an overshoot reduction to 10 times; a regulation time reduction to 10 times. While investigating the systems with P - controller it ought to be remarked an overshoot expansion, the system static error being reduced to 20 times.