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ADAPTIVE ALGORITHMS IN THE SELF-ADJUSTING FILLING CONTROL SYSTEM FOR SELF-GRINDING DRUM MILLS

Topic relevance. The main part of all capital and operating costs in the enrichment of ores falls on the grinding process. For the self-grinding process, the degree of filling of the mill drum is a critical technological variable, i.e. this parameter not only has a direct impact on the efficiency of the grinding unit in terms of the newly formed finished product [1], but also determines the trouble-free operation of the mill.

Problem investigation. We consider a local system [2] for stabilizing the filling of the mill at the set level φ_{set} by controlling the feed of the initial material (Fig. 1). In this case, we will assume that the calculation of the value of φ_{set} is performed by a system of a higher level of the hierarchy.

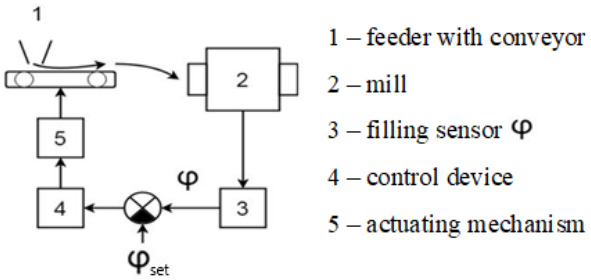

Figure 1 - Functional diagram of the adaptive control system for stabilizing the filling of the drum mill

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The self-grinding mill with a feeder as an object of control of the OC can be represented as an inertial link of the second order (Fig. 2).

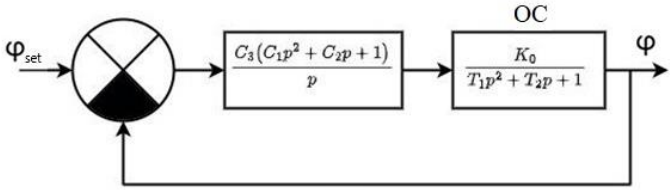

Figure 2 - Structural diagrams of the main circuit of the control system

The calculation of transition process in the main circuit [3], as well as the processes of setting the parameters of the controller C_1, C_2, C_3 when changing the parameters of the control object K_0, T_1, T_2 was performed by a numerical method Δt. The changes in the parameters of the object were carried out by a shift in the range of $\pm$ 20% of the nominal values, which corresponds to real conditions.

Practical significance. Using the method of auxiliary operators the law for setting the parameters of the main circuit of the self-adjusting system was generated. While calculating the tuning processes in the control system for the filling degree of the mill, it was found that even with a simultaneous abrupt change in the object's parameters K_0, T_1, T_2 to the maximum value, the adaptive system completes tuning the parameters of the controller C_1, C_2, C_3 for a time of about $230 \div 270$ minutes, which indicates the practical feasibility and effectiveness of this approach to control the filling level of ore self-grinding mills.

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