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DESIGN AND ANALYSIS OF ELECTROMECHANICAL SYSTEMS WITH  
DISTRIBUTED PARAMETERS WITH MICROPROCESSOR CONTROL  
SYSTEMS

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БЕЛОРУССКО-РОССИЙСКИЙ УНИВЕРСИТЕТ

Hanging wire ropes which are used in a mine hoist are elastic. So oscillation phenomena are possible in the mechanical part of such system, i.e. during the moment of the starting the motor the speed of the loaded container and the speed of the electric drive is different. It causes additional problems in designing of control systems of electric drive, because in this case it is necessary to damp the oscillation. The automated electric drive has possibility of damping the oscillation. But this possibility still hasn't been realized.

There is a mathematical model which describes this element. But the model was not verified on a real equipment. If the model really works there will be an opportunity to create a more perfect control system of an electric drive which lets us to reduce power consumption, increase performance and safety of the whole system.

In order to try this mathematical model we designed the laboratorial equipment. The reason for designing this equipment was the impossibility of doing analysis on the real mine equipment. The system is designed for the analysis of a long element with distributed elasticity in a laboratory.

The designed system works according to the same principle as a hoist in underground mining and imitates the behavior of the long wire ropes during the starting of the electric motor.

The designed equipment was assembled. The significant advantage of the system is wide pass band of the electric drive.

Today we have first results. Some of them we received during the computer simulation. For example, bode magnitude plot of part with distributed parameters. Also we made experiments on assembled equipment. We received Relation between oscillation amplitude of the long element and frequency of the input signal.

The designed equipment can be used:

- for teaching students during laboratory classes;
- in R&D department in factories which are engaged in design and research of electromechanical systems with distributed parameters.