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THE DEVELOPMENT OF SOME METHODS BY CONTROL OF OBJECTS WITH DELAY

In view of the development of automatic control theory and simulation of control objects, currently more and more notice is given to objects with delays. This phenomenon consists in the fact that, with the change of the input signal of control objects the output signal begins to change only after a certain period of time.

Control objects with delay are often encountered in practice when synthesizing control systems.

The most common examples of objects with delay may be the processes of drying and burning, calcination of the metal, belt conveyors, size reduction processes, and in some cases, the processes in chemical reactors.

Description of mathematical models of processes in control objects with delay execute by means of differential equations with deviating argument. The difficulties in the mathematical solution of these equations stipulate the problems of technical implementation of control systems with delays.

From the above it follows the need to compensate of delays to the application of embedding technology. One possible way of implementation is the introduction of Smith compensator in output and control channel.

However, this method may be used only where the model of control object is calculated as accurately as possible, and, most importantly, do not change over time. Unfortunately, in most production processes is observed the reverse situation (changing the raw materials, environment, etc.).

That is when the parameters of the model of control object, the values of Smith compensators for the control and output remain the same, and as a consequence, the phenomenon is not fully compensated for the delay. As a result, precipitous changes of values for the state spaces variables are exerted in terms of time point overlaps with delays.

If the control object resides at stability bounds, these changes will significantly affect descriptive adjectives of the object.

On the other hand the influence of delays takes into consideration by the expansion of delays in different series. In automatic systems most commonly used series expansion of the Pade as the most simple to implement.

In the resulting after expansion the equations for the calculation of regulators and compensators delays are receded. As a result, it becomes

possible to apply the embedding theory for the synthesis of control systems.

Due to the rapid development of microprocessor-based automation hardware to modern systems control makes more and more stringent requirements. Therefore there is a need to develop new methods of management objects with delay, taking into account the requirements imposed on the specific control systems.

Often observed in the control systems of a situation in which an object parameter with delay described by the equations for continuous systems, and regulated two-position control system. To improve the quality indicators for such systems developed mathematical tool called "hybrid dynamic systems".

In the description of modern control systems, as with delays, and without them ever more widely used the description in a state space. This presentation is most convenient to work with multi-dimensional control systems.

For transition from differential-difference equations to the model in state space we can use the structural form, called the canonical form of observability. In this case the physical meaning of the state variables of the object is conserved.

Because many of today's controllers have the ability to work in the description of the system in state space, the results of the calculation of regulators and compensators simply apply to particular processes.

Studying the issues of control of objects with delay is an important part of modern control systems. The use of modern microprocessor means allows approaching the problem of forming control actions on objects with delay from the point of view of applying increasingly complex algorithms in mathematical terms.

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СРАВНИТЕЛЬНЫЙ АНАЛИЗ АППРОКСИМАЦИИ ЗВЕНА *(1-W(P))* РЕАЛЬНО ДИФФЕРЕНЦИРУЮЩИМ ЗВЕНОМ И АПЕРИОДИЧЕСКИМ ЗВЕНОМ ВТОРОГО ПОРЯДКА

При управлении сложными объектами с большими запаздываниями зачастую требует реализацию функции (1-W(p)) для реализации предиктора или системы управления в целом. Данная функция