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MATHEMATICAL MODELING OF CHEMICAL-TECHNOLOGICAL PROCESSES, INFORMATION PROCESSING

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Abstract
The article provides scientific and theoretical information on mathematical modeling of chemical-technological processes, data processing.

Keywords: Modeling, technologies, chemical, method, process, model.

Introduction

Processes of chemical technologies are complex physico-chemical systems, which have stochastic nature with two determinants and variable values in space and time. Flows of substances involved in them are as follows: multiphase and multicomponent. At each point of the phase and at the boundary of the phases, the process acts as a carrier of momentum, energy and mass during the transition period. In general, the whole process takes place in an apparatus with concrete geometric characteristics. In turn, these characteristics affect the transition character of the process.

MAIN PART

An important feature of chemical-technological processes is that the set of phenomena has a deterministic-stochastic nature. The nature of this is evident in the fact that the substance in the apparatus covers the stochastic properties of the hydrodynamic medium for heat transfer and chemical changes. The random interaction of the components of these phases (with collision of particles, their crushing, coalescence, random distribution over the volume of the device) or the boundary conditions of the character of the geometry in the device (random arrangement of the nozzle elements, catalyst grains, sliding media are explained by the producer orientation of the interphase boundary and s.o.).

At the stage of creating a mathematical description, the main events and elements of the object are first isolated and then determined by the relationship between them. For each isolated element and event, an equation (or system of equations) is written that describes its functioning. In addition, equations of connection between various isolated phenomena are included in the mathematical description. Depending on the ratio of the process, the mathematical description is algebraic, differential, integral and integrocan be expressed in the form of a system of differential equations. The stage of choosing a solution method and developing a modeling program involves choosing the most effective (efficient means the speed and accuracy of the solution) solution method among the existing methods, and first the solution is implemented in the form of an algorithm, and then in the form of a program that can be calculated in EHM.

A model built on the basis of physical concepts should accurately and quantitatively describe the properties of the process being modeled, that is, it should be analogous to the process being

modeled. In order to verify the similarity of the mathematical model to the real process, it is necessary to compare the results of the measurements taken from the object during the process transition with the results of the model predictions under similar conditions.

The stage of establishing the monad of the model is the final stage of its development. Figure shows the general scheme of developing a mathematical model.

In the construction of a mathematical model, a real phenomenon is simplified, schematized, and the resulting schema is described using one or another mathematical apparatus, depending on the complexity of the phenomena. The success of the research and the significance of the obtained results depend on the correct consideration of the characteristic features of the studied process in the model.

All the most important factors affecting the process should be taken into account in the model, and at the same time it should not be overloaded with many small secondary factors that need to be taken into account.Obtaining only complicates the mathematical analysis and makes the research too congested or impossible at all. Studying the characteristics of specific mathematical processes using the method of mathematical modeling, which is a precise mathematical description for processes.

Are used in The mathematical description depends on the level of perfection-Depending on , we can distinguish two borderline cases:

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