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MODELING PHASE PROCESSES IN THE SORPTION THERMOTRANSFORMERS

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The study hydrodynamics of multiphase media put the mathematical model.

The purpose of research - to develop a mathematical model of phase sorption processes thermotransformers.

Materials and methods of research. In the development of a mathematical model of a heterophase medium arises the problem of averaging parameters for a certain interval of time and space field. AND IN. Derevich proposed a method for general space-time averaging, depending on the range of values or the shape and scope of the field.

Accept that the position in space, the shape and dimensions of the elements of the discontinuous phase (droplets, bubbles, particles) - random variables.

The equation of motion is introduced function k-flow interaction between the components.

If the inertial effects are relatively insignificant movement phase, then to describe the motion of multiphase media are turning to diffuse approximation.

The results of research. The equation of motion and of state for the whole environment in general, the driving voltage and internal energy stored in this local thermodynamic equilibrium, where each point is possible to determine the ambient temperature T. It is assumed that the deformation rate tensor, u is determined by the velocity field barotsentricheskih mixtures v.

It is believed that the effect of the mixture is directly manifested through physical and chemical parameters in the equation of motion and the condition (heat capacity, viscosity coefficient, modulus of elasticity, etc.).

After a general statement of the problem write a system of equations of one-dimensional motion of two-phase media in Euler variables in a cylindrical symmetry.

These equations must be supplemented by the equations of state for internal energy, stress tensors, heat flux vector. In addition, you must set the intensity kinetics of phase transitions.

Taking the hypothesis of local equilibrium within phase and assuming that the phase is a two-parameter medium, we conclude that the thermodynamic functions of each phase depends only on the thermodynamic parameters of state.

One of the important sections of the dynamics of two-phase media in thermotransformers is condensation kinetics.

An integral part of the process of condensation is nucleation.

A more accurate expression for the rate of nucleation and condensation obtained B. Becker and R. Doering. Their calculation formula differs from M. Volmer pre-exponential factor.

One of the characteristic phenomena that occur in the sorption thermotransformers - this diffusion agent.

Under the action of external forces, eg wind, diffusion takes place in a medium which is a turbulent flow.

The practical tasks of diffusion can be seen in the model of an incompressible fluid.

General patterns studied phenomena can be obtained by mathematical modeling.

The main characteristic of sorption processes is the entropy production. Defined entropy production in porous media.

Whenever the fluctuation of the system from the equilibrium state, irreversible return to its equilibrium state. The tendency of the system to achieve the extremum of the thermodynamic potential, and remain in this state makes the system stable. That is the stability of the equilibrium state of the system is linked to the existence of the thermodynamic potentials.

In contrast to the equilibrium systems that go to the state with the lowest free energy nonequilibrium systems can develop unpredictably: their condition is not always clearly defined macroscopic equations. This stems from the fact that under

the same set of conditions, the non-equilibrium system may move to different states. The reason for this may be fluctuations, small inhomogeneities, defects or other random factors. Which state will pass a particular system, in general, impossible to predict. The new state is achieved in this way are often "ordered states" that have space-time organization.

As a result of the diffusion of nonequilibrium systems may be fluctuations in the concentration and spatial structures; in a closed system as the same dissipative processes blur the heterogeneity of the system and lead to a uniform state.

The problem of entropy production in energy conversion systems analyzed A. Bezhanov. The results obtained allowed to decide on the minimization of heat exchange processes and optimize economic performance.

This method is widely used for the analysis of heat and mass transfer processes in porous media.

Conclusion

The above method of analysis sorption processes can be used to study the phenomena taking place in various types of heat pumps (compression, absorption, and their possible combinations) in sorption accumulators in porous media. Entropy is a measure of the efficiency of the energy against the researched phenomena. The degree of entropy production depends strongly on the parameter $\xi = z / r0$, where r0 - radius of the original porosity. With the increase in the value ξ generating entropy decreases asymptotically approaching zero.