ANALYSIS OF METHODS OF NONEQUILIBRIUM THERMODYNAMICS AND HEAT TRANSFER HYDRODYNAMIC PROCESSES FOR MULTI-MEDIA

B. Draganov, Ph.D.

Any technical system has certain technological structure, ie, consists of a number of interrelated elements. Each structure in a certain j-th level may be characterized by a certain set of variables. At the same time there is a correction between the structures and characteristics of the processes, their generators.

Evolutionary changes in the elements of the system, as well as the evolution of the system as a whole, are the subject of research of many branches of science. In technical devices evolutionary phenomena usually considered from the perspective of two aspects: thermodynamic and kinetic.

Substantial interest deserve questions devoted to the analysis of hydrodynamics of multicomponent media, when one of the components may change its phase state.

The purpose of research - to develop a method for calculating heat transfer and hydrodynamics of multicomponent media.

Materials and methods of research. So far, the heat and mass transfer processes for multicomponent media were investigated on the basis of classical thermodynamics. In this article, the above phenomena were analyzed by non-equilibrium thermodynamics.

When forming a multiphase traffic within multi-continuum defined conditions of joint motion and phase quantities describing intraphase power, energy and phase (mass, power, energy) interaction.

In cases where the inertial effects are insignificant relative to the movement phase, to describe the motion of multiphase media inverting to diffuse, ie single-fluid, approximation.

In the analysis of the technical system must take into account the problem of

interaction between the whole and its parts. In this case, the results obtained in different directions mye studies may be ambiguously. Bell's theorem shows that the correlations that exist between spatially separated but related sys- tems, can not be considered as part of any of the theories describing definite state of individual systems. However, on the other hand, the Onsager showed that in a two-dimensional model of phase transitions occur, ie, in an infinite system may be the order of the structure. The study of the relationships of various physical phenomena does not negate the phenomenological laws that exist within each phenomenon, but it allows us to assess the possibility of heuristic refinements and generalizations of these laws, as well as a deeper understanding of their meaning.

Empirically established principle of "reciprocity" is fundamental and can be called the fourth law of thermodynamics. It should be emphasized that the principle of reciprocity Onzagera- Casimir is of particular importance when modeling real polyatomic gas mixtures in which the components between the implementation vlyayutsya transitions between states with different internal degrees of freedom.

For locally-stationary state of the turbulent field, when the structure of turbulence there is some internal balance, the most complete description of heat and mass transfer in a multicomponent medium can be obtained Stefan-Maxwell relations for multicomponent diffusion and the corresponding expression for the heat flux in the continuum turbulize.

It should be emphasized that the analysis of hydrodynamic processes and teplomass phenomenological approach (based on the provisions of nonequilibrium thermodynamics) provides a defining relation for the thermodynamic diffusion and heat fluxes as well as convenient to calculate the algebraic formulas relating the coefficients of the molecular process.