ANALYSIS OF DYNAMICS AND HEAT VAPOR BUBBLE IN THE GAS-LIQUID MEDIUM

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A mathematical model of the dynamics of bubbles in the gas-liquid medium, said receiving approval; The equations of the one-component ripple bubble; investigate the convective heat transfer and thermal conductivity of the bubble; Nusselt number, Peclet number.

Mathematical model, pulsation, heat, thermal conductivity, of, integral transformations, Nusselt number, Peclet number, the ensemble of bubbles.

The purpose of the study - formulation research method hydro--nomics processes heat and mass transfer in heterogeneous environments. This analyzes the dynamics of both single and ensemble bubbles. This will increase the efficiency of processes related to the dynamics of heterogeneous environments, attendant image-vaniem bubbles.

Materials and methods of research. The growing interest in the problems of wave dynamics of bubble liquids due to the importance of the application of research results to the multidisciplinary challenges of energy [1, 2, 3, 4].

In the evaporation or condensation of vapor on the surface of the bubble phase transition latent heat is supplied or removed in the base fluid, the thermal conductivity is several times more than a couple.

Essential in determining the structure of the wave in the liquid with gas bubbles.

Solution of growth or collapse of bubbles usually obtained on the assumption that the variation of bubble size occur monotonically [29, 30]. This assumption is acceptable when analyzing the boiling process, but it is not justified in the study of cavitation collapse.

The solution of the equation can be performed by the method of integral transformations.

Assuming that the heating or cooling fluid is caused both by heat exchange with the gas phase, and transferring the latent heat of condensation when L or evaporation, can determine the temperature of the interface.

In describing the behavior of an ensemble of bubbles at the micro level and modeli¬rovanii velocity and pressure fields in interbubble space must take into account special features of the hydrodynamic and heat and mass transfer processes in interbubble space with vigorous expansion or contraction of the bubbles, as well as other factors that determine the difference between the behavior of bubbles in the ensemble of the behavior of a single vesicle. Firstly, it is the ensemble of dissimilarity bubbles geometric size, shape, speed and acceleration of the radial motion of the surface. Secondly, it is the force dynamics vzaimodey¬stvie-cally developing bubbles.

Therefore, a detailed analysis of the behavior of two interacting bubbles even is quite complicated and time-consuming task. To assess the situation in interbubble space volume of the ensemble with a large number of bubbles is necessary to introduce simplifying assumptions:

- The liquid is incompressible, and the effect of viscosity occurs only at the interface as a single bubble in the model.

- The ensemble of bubbles in a bubble cloud compact finite element occupies only part of the infinite space of the liquid, the number of bubbles is constant.

- In the evolution of an ensemble of bubbles keep sfe¬richeskuyu shape and not deform. This is true for the relatively small size of bubbles when the capillary pressure compensates the force effect from the other bubbles, provided that the distance between bubbles greatly exceeds their size.

- It takes into account the strong interaction of neighboring bubbles caused by the radial movement of their surfaces, which leads to the mutual movement of bubbles within the ensemble.

- Flow in interbubble space potential.

Presented here the equation for unlimited and limited set of vapor bubbles together with the equations of the dynamics of a single bubble was allowed to predict the behavior of bubbles in the ensemble and the behavior of the ensemble as a whole as the external pressure. With the help of these equations can also determine the velocity and pressure fields in interbubble space and nature of changes in these fields over time in any regime parameters.

Conclusions

This model of the dynamics of a single bubble to adequately describe the behavior of vapor bubbles in any liquid, assuming that the known dependence of the corresponding thermal parameters of temperature.

In interbubble space ensemble even if there are monotonous expanding bubbles noticeable change pressures and velocities characteristic of turbulent flow.

In any direction within the ensemble bubble velocity vector is experiencing dramatic changes not only in size but also in direction.