

عنوان مقاله:

Bubble Dynamics and Nucleate Pool Boiling of Natural Convection

محل انتشار:

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خلاصه مقاله:

The phenomenon of nuclear boiling has always been recognized suitable for heat transfer between different boiling regimes. Study on boiling is considered as a new field which meets different research and industrial needs such as heat transfer in nuclear reactors, cooling units, rocket motors, electronic equipment cooling, batteries, etc. In this study, a chamber with immiscible fluid, water, steam, and air, having a side wall with uniform heat flux has been studied in 3D. To do so, we first considered the prediction of the heat flux interval for which the boiling occurs in the form of nuclear boiling. In this study, two-phase fluid volume (VOF) approach was used for modelling boiling on the vertical wall and two-phase flow. In this research, Ansys software package was used for numerical modelling and numerical simulation. Distribution of the velocity field follows more uniform pattern in dimensionless heights less than 0.9. In this study, bubbles are only present near a wall with heat flux that has a lower Rayleigh number. Also, existence of these bubbles on the wall, which prevents fluid infiltration, affects vortices caused by natural convection. However, the general and uniform patterns of vortices remain unchanged in most part of the fluid, which is because of the limited amount of bubbles near the wall with heat flux. Natural convection increases the height of fluid inside the chamber, which leads to the formation of stronger vortices at a dimensionless height of 0.9 that has a high Raleigh number due to high heat flux. In this case, the continuous use of heat flux gives rise to the production of bubbles over time.

کلمات کلیدی:

Bubble diameter, bubble production frequency, nuclear boiling, Volume fraction

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