CHANNEL SIZE EFFECTS ON FLOW BOILING CHARACTERISTICS AT NORMAL GRAVITY

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Boiling is known to be a very efficient mode of heat transfer, and as such, it is employed in component cooling and in various energy conversion systems. Applications of boiling heat transfer in space can also be found in the areas of thermal management, fluid handling and control, power systems, and so on. The major advantage of boiling heat transfer is that the size and the weight of the components, which play important roles in the economics of the mission, can be significantly reduced for a given power rating.

Presently, the needed low-gravity environment is usually provided using both parabolic aircraft and drop tower. Its accessibility, however, is limited, particularly in China. The cost is also high. The alternative is the use of simulating microgravity test in a laboratory environment, such as the use of small tubes. It is based upon the fact that the impact of surface tension forces becomes a dominative factor while the natural convection is deeply suppressed in microgravity condition. In this study, rectangle channels (size from 1 to 2.5mm) are adopted to implement the boiling heat transfer experiment. The effects of channel size are analyzed. The results show that the small channel can effectively reduce the effects of buoyancy, and the method can partially simulate the boiling heat transfer characteristics in microgravity.

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