

MICROGRAVITY SCIENCES AND PROCESSES (A2)  
Fluid and Materials Sciences (2)

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TWO PHASE FLOWS: BUBBLE GROWTH IN SUPERHEATED FLUID

**Abstract**

Under a sudden decompression of a containment with condensed gas the liquid comes into an over-heated state: the temperature of saturated vapor decreases with the pressure drop and the fluid temperature turns out to be above the one of saturated vapor. The vapor bubbles appear in the superheated liquid. The pressure gradient appearing in accelerated flow accelerates light bubbles faster than heavy liquid surrounding them. The difference in phase velocities may reach meters per second. The streaming of a bubble by liquid intensifies significantly the heat exchange between the liquid and liquid-vapor interface. The heat exchange significantly influences the dynamics of a two-phases flow, while the value of relative velocity of liquid streaming the bubble significantly influences the heat exchange. Therefore, when modeling non-equilibrium flow of boiling liquid it is necessary to take into account the influence of phase velocity difference on the interface heat exchange. The influence of the bubble streaming on the evaporation is noticeable even in experiments on vapor bubbles floating up in a superheated liquid under normal gravity, though in this process the difference in phase velocities is only of the order of centimeters per second. (Russian Foundation for basic research is acknowledged for financial support, project code 08-08-00222a).