

Azimuthal Critical Heat Flux in Narrow Rectangular Channels

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Abstract

Tests were conducted to examine the critical heat flux (CHF) on the one-dimensional downward heating rectangular channel having a narrow gap by changing the orientation of the copper test heater assembly in a pool of saturated water under the atmospheric pressure. The test parameters include both the gap sizes of 1, 2, 5 and 10mm, and the surface orientation angles from the downward-facing position (180°) to the vertical position (90°), respectively. Also, the CHF experiments were performed for pool boiling with varying heater surface orientations in the unconfined space at the atmospheric pressure using the rectangular test section. It was observed that the CHF generally decreases as the surface inclination angle increases and as the gap size decreases. In consistency with several studies reported in the literature, it was found that there exists a transition angle above which the CHF changes with a rapid slope. An engineering correlation is developed for the CHF during natural convective boiling in the inclined, confined rectangular channels with the aid of dimensional analysis.