

## Experimental and Analytical Study on the Simulation of Pool Boiling CHF Based on Macrolayer Dryout Model

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### ABSTRACT

This paper presents a non-heating experimental- and analytical-method which simulates the critical heat flux (CHF) phenomenon in pool boiling. With providing controlled air flow through the holes on a plate submerged in a pool of water, the liquid sublayer (macrolayer) thickness and bubble departure frequency have been successfully measured by a conductance probe. The CHF is reasonably predicted by applying the measured parameters to a liquid macrolayer dryout model. The measured trends of the macrolayer thickness and bubble departure frequency with air mass flux are also consistent with the present understanding. On the other side, a simple analytical model in which bubble growth is simulated as a growth of spherical bubble is developed, and several parametric effects are studied. The general trends well agree with the experimental results and general understandings. Overall, the non-heating method would be useful to investigate the various parametric effects on pool and flow boiling CHF, with avoiding the difficulty in heating and large electric power requirement even for complex geometry.