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Strange Behavior of Boiling Around Wire Heater at The Pressure Condition Very Close to The Lambda Point

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It was found in our past microgravity experiments that the bubble size was much smaller than the prediction in the vicinity of the lambda point, and the bubbles had unstable interfaces. However, no experimental reports like this anomalous feature of He II boiling at the vicinity of lambda point were shown. Therefore, in this study, we focused on the boiling experiments around wire heater in He II very close to the lambda point were. The 50-micron wire heater of manganin were set horizontally on the height adjustable rod in He II glass Dewer. The heater temperatures were calculated by the calibration curve of correlation between electric resistance and temperature. The heater power and the resistance were measured by the four-terminal method. The immersion depth was changed to investigate the effect of small subcooling due to gravity. Under the several saturated vapor pressure conditions b, 35.5, 36.0, 36.5, 37.0 and 40 torr, the boiling curves were compared. In the comparison between boiling curves the new findings were not appeared.
At the pressure condition very close to lambda point, the precise pressure control is quite difficult. Thus, the pressure was raised up very slowly around the lambda temperature at the fixed heat flux to obtain quasi-steady state. The heater temperature had been changing many times with the inflection point with the audible noise during raising pressure though silent boiling mode should be occur in this region. In the saturated pressure condition, the two modes were known in He II. One is the noisy film boiling mode, another one is silent film boiling mode. The silent film boiling mode has stable vapor film with no-audible noise. And it is found that the boiling heat transfer coefficient just above lambda point is higher than that just below lambda point.

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