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Growth and collapse of a single nucleated bubble in a subcooled flow MARYAM MEDGHALCHI, NASSER ASHGRIZ, University of Toronto — Subcooled flow on heated surfaces may result in the condensation and collapse of nucleated bubbles. A numerical study accounting for the heat and mass transfer at the gas-liquid interfaces of a nucleated bubble is performed. The model considers (i) the microlayer between the bubble and the heated surfaces, where the liquid is trapped and its temperature rises above the saturation temperature; and (ii) bubble evaporation and condensation using Hertz-Knudsen equation. The results show that the thermal boundary layer inside the bubble grows faster than that inside the liquid. This is mainly due to the buoyancy induced circulating flows inside the bubble, and different interface heat and mass transfer rates at the top and the bottom of the bubble. The calculated microlayer thicknesses are found to be less than those provided by the existing correlations.

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