

Abstract Submitted
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Computations of Nucleate Boiling¹ GRETAR TRYGGVASON, University of Notre Dame, JIACAI LU, Worcester Polytechnic Institute — Simulations of boiling flows have progressed significantly in the last decade and it is now possible to accurately compute the film boiling of fluids under a wide range of conditions, for example. Although some progress has been made in simulating nucleate boiling, considerable challenges remain, particularly for water under atmospheric pressure. The challenges include the resolution of thin film between a growing vapor bubble and the hot wall, steep thermal gradient at the phase boundary, and the determination of the distribution and activation of nucleation sites. We report on recent progress using a front tracking method to follow the phase boundary, coupled with a multiscale strategy to capture the microlayer and resolve steep thermal gradients. The results including comparison with experimental results and simulations of bubbles released from multiple nucleation sites for both pool and flow boiling. Preliminary results indicate that for moderate nucleation site density the bubbles are formed relatively independently of each other.

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