

Abstract Submitted
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A critical comparison between computational models of evaporation and boiling¹ MEHDI VAHAB, MARK SUSSMAN, KOUROSH SHOELE, Florida State University — The phase-change of liquid to vapor may be as volatile as film boiling, or as calm as surface evaporation. Several physical models have been proposed to represent these phenomena, e.g., energy jump, energy-concentration jump, and Schrage. Here, we present a comparative study between these models and their variants and discuss their range of application and their accuracy specifically for cryogenic flow conditions. The temperature of the liquid-vapor interface is another point of contention for phase-change models. We measure the contribution of the pressure jump, surface curvature, and specific volume difference and cross-compare their effects on the mass and energy transfer at the interface. The implementation of the models in the multi-material multi-phase computational code and its validation with theoretical and experimental results are shown. Finally, the suitability and accuracy of these models are assessed in surface evaporation, nucleate pool boiling, and film boiling in 2D and 3D configurations.

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