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**Numerical Simulation on Hydrodynamics and Phase Change Associated with Multi-bubbles During Nucleate Boiling** XIAO-YONG LUO, MING-JIU NI, ALICE YING, MOHAMED ABDOU, UCLA — Development of predictive capability for hydrodynamics and phase change associated with multi-bubbles during nucleate boiling is essential to evaluate liquid wall protection schemes for various fusion chambers. This paper presents a numerical methodology for multiphase flow with phase change to help resolve feasibility issues encountered in the aforementioned fusion engineering fields. The numerical methodology is being conducted within the frame work of the incompressible flow with phase change. We present a new second order projection method, in conjunction with Approximate-Factorization techniques (AF method), for incompressible Navier-Stokes equations. The Crank-Nicholson method was used for the diffusion term to eliminate the numerical viscous stability restriction and 3rd order ENO scheme used for the convective term to guarantee the accuracy of the method. A four-level V cycle multigrid algorithm for pressure Poisson equation is used in order to decrease computation time. The level set method is used to capture the free surface of the flow and the deformation of the droplets accurately. This numerical investigation identifies the physics characterizing transient phase change and hydrodynamic interactions of the multi-bubbles during the nucleate boiling.

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