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DNS of unstable bubble growth in a superheated liquid[1] ARASH ASADOLLAHI, ASGHAR ESMAEELI, Southern Illinois University Carbondale, ROBERT FERRIS, JIM HERMANSON, The University of Washington — Direct Numerical Simulations are performed to study growth of a vapor bubble in a pool of superheated liquid. At sufficiently low superheats, the bubble growth is stable and isotropic and the bubble surface is smooth. In this case the growth rate conforms to the classical theory for diffusion-controlled growth regime. However, as the degree of superheat is increased, the growth becomes unstable, as a result of protrusions that develop at the bubble surface and grow with time. This leads to evaporative mass fluxes that are much higher than those for the stable growth. This study is to investigate the transition from stable to unstable growth and to shed some insight into the key aspects of the unstable growth, such as correlation of the evaporative mass fluxes with the increase in the surface area of the bubble. Experiments are also performed by the University of Washington to compliment the computational modeling.

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