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Actively Enhanced Boiling Heat Transfer using Acoustic Interfacial Actuation THOMAS R. BOZIUK, MARC K. SMITH, ARI GLEZER, Georgia Institute of Technology — Acoustic actuation is used to enhance boiling heat transfer on a submerged surface by controlling the formation and evolution of vapor bubbles and inhibiting instabilities that lead to film boiling and critical heat flux. The receptivity of a vapor bubble that forms at a prescribed nucleation site to acoustic interfacial excitation and to acoustically induced Bjerknes body forces is investigated on a surface-embedded hot spot with emphasis on the acoustic effects on nucleation, growth, contact-line motion, condensation, and detachment. The investigation also considers arrays of vapor bubbles that form on a prescribed grid of surface-engineered nucleation sites and the interactions between adjacent vapor bubbles. It is shown that acoustic actuation enables dissipation of higher heat fluxes at a given surface temperature, and a significant delay of the critical heat flux with reduction of the vapor mass above the surface. Supported by ONR.

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