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Enhanced Boiling Heat Transfer using Acoustic Interfacial Actuation[1] THOMAS R. BOZIUK, MARC K. SMITH, ARI GLEZER, Georgia Institute of Technology — Low-power acoustic actuation is used to enhance boiling heat transfer on a submerged surface and inhibit the instabilities that lead to film boiling at the critical heat flux by controlling the formation and evolution of the vapor bubbles. The effects of the acoustic field are investigated using a flat boiling heat transfer surface having a central, isolated hot spot that is designed to control the location, growth, and detachment of a single vapor bubble using a thin hydrophobic coating centered around the hot spot. Specific emphasis is placed on the coupling between the frequency and sound pressure and bubble diameter. It is shown that the acoustic field induces interfacial instabilities that affect the bubbles' contact line with the surface leading to their detachment. In addition to contact line dynamics, the primary and secondary Bjerknes forces play an important role in the detachment and advection of vapor bubbles.

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Thomas R. Boziuk
Georgia Institute of Technology

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