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Ultrasonically-Enhanced Condensation Heat Transfer using Droplet Ejection THOMAS BOZIUK, MARC SMITH, ARI GLEZER, Georgia Inst of Tech — Ultrasonic actuation of the liquid-vapor interface between co-flowing layers of vapor and slow-moving sub-cooled liquid which exploits the difference in acoustic impedance to form a multi-scale train of droplets ejected into the vapor flow is investigated experimentally. The increased interfacial surface area of the ejected droplets results in increased heat transfer between the vapor and the liquid and a significant increase in vapor condensation rate. A two-stream liquid-vapor experimental setup was designed to assess the effects of the acoustic actuation on the formation and ejection of the subcooled liquid droplets and the enhanced condensation over a range of flow rates and liquid subcooling. The present measurements yield the increases in the sensible heat of the liquid stream and the increased rate of mass transfer from the vapor to liquid stream. Comparisons of temperature distributions in the absence and presence of actuation are used to assess the enhanced heat transfer between the vapor and liquid phase at both steady-state and transient conditions and indicate applications to tube heat exchangers.

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