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Gravity Effects on Pool Boiling Heat Transfer[1] AKASH DHRUV, ELIAS BALARAS, Department of Mechanical and Aerospace Eng., George Washington University, AMIR RIAZ, JUNGHO KIM, Department of Mechanical Eng., Univesrity of Maryland College Park — Effects of gravity on boiling heat transfer efficiency is of special interest due to its application in two-phase cooling systems for spacecraft and satellite components. Experimental investigations have identified trends in heat flux scaling that demonstrate two distinct boiling regimes dominated by buoyancy (BDB) in high gravity and surface tension (SDB) in low gravity. Regression models constructed from experimental data show that the transition between the two regimes is dependent on heater size and degree of sub cooling. However, the bubble dynamics in this intermittent region are not very well understood. This serves as a motivation to identify heat flux mechanisms associated with bubble shape, size and merger using high fidelity numerical techniques to increase scientific understanding of the process. In this talk, we will present results from our three-dimensional simulations, show a quantitative and qualitative agreement with experiments, and discuss bubble statistics that govern the scaling of heat flux in BDB, SDB and transition regimes.

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Elias Balaras
Department of Mechanical and Aerospace Eng., George Washington University

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