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Effect of Bi-Modal Exciation of an Impinging Jet on Cooling of a Heated Impingement Surface[1] BASIL ABDELMEGIED, AHMED NAGUIB, Michigan State Univeristy — Impinging jets have many engineering applications, such as heating, cooling, and drying. This work is part of a larger study focused on using different active flow control strategies for enhancement of the cooling effectiveness of impinging jet arrays. Here, we examine the influence of bi-modal acoustic forcing on the Nusselt number (Nu) distribution resulting from an axisymmetric jet impinging on a heated flat surface. The forcing scheme utilizes two concurrent sinusoidal waves, at the jet's shear layer fundamental and sub-harmonic frequencies, to take advantage of the jet's sub-harmonic resonance. The Nu distribution is measured using temperature-sensitive paint applied to a heated stretched stainless steel foil. Data are obtained for jet Reynolds number based on jet diameter of 4000, jet-exit-to-plate distance range of 2 to 4 diameters, and different forcing parameters. The results illustrate the influence of the control on the jet's cooling effectiveness and the dependence of this influence on the flow and the forcing parameters. Flow visualization is used to examine associated changes in the flow structure.

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