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Experimental evaluation of a system of multiple angled impinging jets in a turbulent water flow JEAN-PHILIPPE DELAFORGE, French Military Academy of Saint-Cyr, MICHAEL BENSON, BRET VAN POPPEL, US Military Academy, CHRISTOPHER ELKINS, Stanford University — Impinging jets are frequently used for applications requiring high heat transfer rates. Effective area coverage is obtained by grouping these jets spatially, though such flows are more challenging to measure except in an averaged sense, and simulations historically fail to accurately predict the behavior in the vicinity of the impingement zone. In this work, we present results from an experimental technique, Magnetic Resonance Velocimetry (MRV), which measures the three components of three-dimensional time-averaged velocity field with two impinging jets. The geometry considered in this study includes two circular jet angled at 45 degrees and impinging on a flat plate, with a separation of approximately seven jet diameters between the jet exit and the impingement location. Two flow conditions are considered, with Reynolds numbers of roughly 8,000 and 14,000. Measurements from the MRV experiment are compared to predictions from Reynolds Averaged Navier-Stokes (RANS) simulations, thus demonstrating the utility of MRV for validation of numerical analyses of impinging jet flow.

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