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Magnetic Resonance Velocimetry analysis of an angled impinging jet ALEXANDRE IRHOUD, French Military Academy of Saint-Cyr, MICHAEL BENSON, CLAIRE VERHULST, BRET VAN POPPEL, United States Military Academy, CHRIS ELKINS, Stanford University, DAVID HELMER, United States Military Academy — Impinging jets are used to achieve high heat transfer rates in applications ranging from gas turbine engines to electronics. Despite the importance and relative simplicity of the geometry, simulations historically fail to accurately predict the flow behavior in the vicinity of the flow impingement. In this work, we present results from a novel experimental technique, Magnetic Resonance Velocimetry (MRV), which measures three-dimensional time-averaged velocity without the need for optical access. The geometry considered in this study is a 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 800 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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