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Experimental Study of Turbulent Impinging Jets of Dilute Polymer Solutions RICARDO MEJIA-ALVAREZ, KENNETH CHRISTENSEN, Department of Mechanical Science and Engineering, University of Illinois at Urbana-Champaign — Turbulent impinging jets play an important role in a variety of technologically-relevant applications, including cooling, heating and drying operations, drilling and mixing. Many of these applications take advantage of the enhanced heat transfer commonly observed near the impingement surface where complex vortex interactions are known to exist. Dilute polymer solutions have been observed to stabilize free jets but their impact on further heat-transfer efficiency in the impinging-jet configuration has not been adequately addressed. To this end, the impact of dilute polymer solutions on the structure of turbulent impinging jets is being studied using particle-image velocimetry. Measurements are made for both plain water and dilute polymer solutions (< 100 ppm) at comparable Reynolds numbers for various nozzle-to-plate spacings. Instantaneous velocity fields are analyzed to uncover structural modifications imposed by the presence of polymer, particularly in the impingement zone. Turbulence statistics are also computed to assess the overall impact of dilute polymer solutions on this complex turbulent flow. These measurements will be followed by simultaneous velocity–temperature measurements to deduce the impact of dilute polymer solutions on heat transfer in the impingement zone.

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