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Turbulent structures of impinging circular jet VESSELINA ROUSSINOVA, RAM BALACHANDAR, University of Windsor — Turbulent impinging jets are used in various engineering applications due to their ability to provide superior heat and mass transfer. In hydraulic engineering, impinging jet flows have a detrimental effect due to their ability to scour and erode sand beds. In order to gain a better insight into the mean flow, turbulence and coherent structures in impinging jet flows, we performed high resolution particle image velocimetry (PIV) measurements of a round normally impinging jet issuing from a nozzle with diameter d = 0.01 m at Reynolds number Re =20 000 and at the jet-to-plate distance H = 20d. This configuration was chosen to match previously reported experiments and to verify results obtained from numerical simulations in which several phenomena have been noted, but the underlying turbulence dynamics remained obscure. PIV velocity fields are measured in the streamwise - spanwise (x-z) planes in the free jet and stagnation regions while streamwise - wall normal (x-y) planes are probed in the radial wall jet region in the immediate proximity of the impinging plate. The focus of this study is to investigate in details mean velocities, various turbulent quantities and vorticity. Analysis of the coherent structures is also documented through the analysis of swirling strength and proper orthogonal decomposition (POD).

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