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Characterization of far-field jet flows from complex nozzles via Particle Tracking Velocimetry JIN-TAE KIM, Department of Mechanical Science and Engineering, University of Illinois at Urbana-Champaign, ALEX LIBERZON, School of Mechanical Engineering, Tel Aviv University, Israel, CARLO ZUNIGA ZAMALLOA, University of Illinois at Urbana-Champaign, LEONARDO P. CHAMORRO, Department of Mechanical Science and Engineering, University of Illinois at Urbana-Champaign — Understanding the advection, diffusion and mixing of turbulence and scalars of jet flows under various geometric configurations and Reynolds numbers is of high relevance in environmental and engineering applications. In this experimental study, we characterize the far-field turbulence of jet flows in the proximity of twelve rotor diameters downstream of a series of complex nozzle geometries. The jet flows are released into a still body of water from a series of nozzles of different cross sections but with common hydraulic diameter dh= 0.01 m at a Reynolds number Re= U0*dh/ν approx. 7000, where U0 is the flow velocity at the outlet of the jet and ν is the kinematic viscosity of the flow. The system is closed-loop and seeded with particles of 100 μm diameter. Results are analyzed from Lagrangian and Eulerian frames of references via 3D particle tracking velocimetry (OpenPTV, www.openptv.net). Lagrangian features of the particles are characterized in terms of the nozzle geometries and high-order turbulence statistics are obtained at various planes within the interrogation volume, which mimics 3D PIV.

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