Abstract Submitted
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Effect of background turbulence on passive scalar mixing of a heated jet in a turbulent coflow[1] FANNY LEGAY, LAURENT MYDLARSKI, McGill University — Turbulent jets are commonly encountered flows, which frequently transport a scalar and occur in both natural and man-made settings (e.g. pollutants being dispersed from a smokestack into the atmosphere; injection of reactants into a combustor). In the majority of such contexts, the jet issues into an environment that is turbulent – a factor that plays a key role in the jet's subsequent evolution, yet one that has been the subject of little study. The objective of this work is to therefore quantify the (longitudinal and radial) velocity and scalar fields of an axisymmetric turbulent jet of heated air emitted into a homogeneous, isotropic turbulent background. Emphasis is placed on simultaneous measurements of the velocity and scalar (viz. temperature) fields, with the aim of both quantifying and further understanding the mixing process. Hot-wire anemometry and cold-wire thermometry are employed to this end. The simultaneous measurements of the jet's velocity and temperature fields are made in background flows of different turbulence intensities, at various downstream positions, for four jet-to-coflow velocity ratios. Statistics of the velocity fields, scalar fields, and combined velocity-scalar statistics (e.g. turbulent scalar fluxes) will be presented and discussed.

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