Abstract Submitted
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The role of turbulent inflow on the development of a jet in cross-flow[1] GRAHAM FREEDLAND, GREG SAKRADSE, Portland State University, STEPHEN SOLOVITZ, Washington State University, RAÚL BAYOÁN CAL, Portland State University — Prediction of the development of jets in cross-flow has many useful applications in various fields such as chemical mixing and volcanic plume models. Most models used to predict the growth assume irrotational flow when both atmospheric and high Reynolds number flows are not. Simple laboratory experiments of air jets in crossflow downstream of an active grid system are used to simulate uniform turbulent inflows. A jet of air is injected orthogonally into a closed-loop wind tunnel with several cross-flow velocities and three active grid settings to simulate a range of turbulent conditions. Mean flow statistics and Reynolds stresses are computed using PIV data to identify key regions of interaction. The flow-fields are reoriented to provide components normal and tangential to the centerline of the jet and descriptions of the trajectory and shear layer expansion are quantified and compared. Analysis is then focused on the evaluation of the dissipation and eddy viscosity for the purpose of refining $k - \varepsilon$ modeling parameters. Identifying the differences turbulent cross-flow has on development of the jet and lee-side wake region provides more details on the important features necessary for accurate prediction of the spread and entrainment.

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