Abstract Submitted
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Stability and sensitivity analysis of jets in crossflow[1] MARC REGAN, KRISHNAN MAHESH, University of Minnesota — Global linear stability and adjoint sensitivity are used to analyze the low speed jet in crossflow (JICF). The simulations and analyses are both performed on unstructured grids at a jet Reynolds number of 2000, based on the jet exit diameter and the average velocity at the jet exit. Two jet-to-crossflow velocity ratios ($R = v_{jet}/u_\infty$), $R = 2$ and $R = 4$, based on the maximum jet exit velocity, are chosen to study the transition of the upstream shear-layer from absolutely to convectively unstable. The most unstable frequencies from the stability analysis correspond to shear-layer modes, and agree qualitatively and quantitatively with experiment, DNS and DMD, over both regimes. High frequency downstream shear-layer modes become prominent at the higher velocity ratio. The adjoint and wavemaker modes reveal the importance of the nozzle and the jet near-field. Low frequency wake modes and their asymmetries will also discussed.

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