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An Experimental Study of the Far-Field of an Incompressible Swirling Jet ABOLFAZL SHIRI[1], WILLIAM K. GEORGE[2], Chalmers University of Tech., Sweden, JONATHAN W. NAUGHTON[3], University of Wyoming, Laramie, USA — Incompressible swirling jets at different Reynolds numbers have been studied using laser Doppler anemometry method. Swirling flow produced by three pairs of symmetric injectors has been kept in the range to avoid vortex breakdown. The resulting swirling jets had a solid-body like swirl distribution at the nozzle exit. Jet growth rate and the velocity profiles have been studied at different swirl number. They have been compared to non-swirling axisymmetric jets with the same specifications. The swirl number plays an important role in that it can enhance the growth rate of the jet. The increase in growth rate starts when the swirl number reaches to a certain value (S>0.15). In this study, we tried to cover enough downstream distance of the jet to investigate the self-similarity of the Reynolds stresses. The predictions of the self-similar solutions theory were compared with the experiment in order to determine if the solutions describe the evolution of the flow at far field. It was found that the data from the experiments were in good agreement with the predictions from the analysis.

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