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Unsteady Simulation of an ASME Venturi Flow in a Cross Flow
JEREMY BONIFACIO[1], CEERS/CSULB, HAMID RAHAI[2], MAE Dept., California State University, Long Beach — Unsteady numerical simulations of an ASME venturi flow into a cross flow were performed. The velocity ratios between the venturi flow and the free stream were 25, 50, and 75%. Two cases of the venturi with and without a tube extension have been investigated. The tube extension length was approximately 4D (here D is the inner diameter of the venturi's outlet), connecting the venturi to the bottom surface of the numerical wind tunnel. A finite volume approach with the Wilcox K-ω turbulence model were used. Results that include contours of the mean velocity, velocity vector, turbulent kinetic energy, pressure and vortices within the venturi as well as downstream in the interaction region indicate that when the venturi is flushed with the surface, there is evidence of flow separation within the venturi, near the outlet. However, when the tube extension was added, the pressure recovery was sustained and flow separation within the venturi was not present and the characteristics of the flow in the interaction region were similar to the corresponding characteristics of a pipe jet in a cross flow.

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