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Modifying the inlet characteristics of a Turbulent Coanda Wall Jet ANSHUMAN PANDEY, JAMES W. GREGORY, Ohio State Univ - Columbus — The Coanda effect has been ingeniously used over the past century for augmentation of lift. More recently, NOTAR helicopters have employed the use of the Coanda effect for producing the stabilizing side force with quieter and safer configurations. A manifestation of the Coanda effect in its simplest form is a wall jet issuing tangentially to a cylinder that tends to stay attached to the cylinder over turning angles as large as 180 degrees. An experimental study on such a configuration has been performed in this work to understand the effect of inlet characteristics on the evolution of the wall jet. In previous studies, it has been found that the radial momentum influx is maximum near the inlet and it provides the necessary centrifugal force for the jet to stay attached. So it can be hypothesized that a protrusion of the upper wall of the nozzle that issues the jet would lead to an earlier separation and decreased efficiency. On the other hand, the predisposition of the jet to stay attached to the flat surface of the protrusion could create a separation bubble between the jet and the curved wall and lead to increased suction. These competing phenomena have been explored using Particle Image Velocimetry performed in the streamwise direction at mid-span location of a 3 ft long cylinder. The effect of varying the length of the protrusion for different combinations of initial jet width and flow velocity has been studied to understand how changing the inlet affects the efficiency of the wall jet.

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