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Investigation of the Unsteady Total Pressure Profile Corresponding to Counter-Rotating Vortices in an Internal Flow Application KATHRYN GORDON, SCOTT MORRIS, ALEKSANDAR JEMCOV, JOSHUA CAMERON, University of Notre Dame — The interaction of components in a compressible, internal flow often results in unsteady interactions between the wakes and moving blades. A prime example in which this flow feature is of interest is the interaction between the downstream rotor blades in a transonic axial compressor with the wake vortices shed from the upstream inlet guide vane (IGV). Previous work shows that a double row of counter-rotating vortices convects downstream into the rotor passage as a result of the rotor blade bow shock impinging on the IGV. The rotor-relative time-mean total pressure distribution has a region of high total pressure corresponding to the pathline of the vortices. The present work focuses on the relationship between the magnitude of the time-mean rotor-relative total pressure profile and the axial spacing between the IGV and the rotor. A survey of different axial gap sizes is performed in a two-dimensional computational study to obtain the sensitivity of the pressure profile amplitude to IGV-rotor axial spacing.

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