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Attenuation of Self-Sustained Oscillations Due to Flow Past Slotted and Perforated Plates PHILIP BRENEMAN, DONALD ROCKWELL, Lehigh University — Turbulent inflow past a perforated or slotted plate, bounded on one side by a large cavity, can give rise to highly coherent, self-sustained oscillations. At low Mach number, and in absence of wall elasticity, these oscillations may be viewed as purely hydrodynamic. Attachments to the backside of the slotted or perforated plate have been critically evaluated as potential techniques of attenuation. High-image-density particle image velocimetry and unsteady pressure measurements lead to representations of the flow structure that are associated with maximum reduction of pressure amplitude. Time-averaged and phase-referenced images show that dramatic alterations of both the instability and the associated mean flow patterns can be attained. Moreover, global spectral analysis, based on simultaneous time records at thousands of grid points of the cinema imaging, provides insight into the spatial patterns of the attenuated pressure amplitude. For a given configuration, both the patterns of the instability along the plate and the patterns of pressure amplitude can be attenuated to a high degree.

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