Abstract Submitted
for the DFD06 Meeting of
The American Physical Society

Attenuation of Self-Excited Oscillations of Shear Flow Past a Perforated or Slotted Plate: Effects of Leading-Edge Ramp EMINE CELIK, CAGRI SEVER, DONALD ROCKWELL, Lehigh University — Grazing flow past a perforated or slotted plate, bounded on its backside by a closed cavity, can give rise to highly coherent, self-sustained oscillations that have a wavelength much longer than the length scale of the slot or perforate. This investigation aims to suppress these purely hydrodynamic oscillations via small amplitude deflection of the inflow, induced by a ramp located at the leading-edge of the plate. Both unsteady pressure measurements and quantitative imaging of the flow structure reveal the essential features of the most effective attenuation. A central aspect is formation of a large-scale bubble involving steady entrained flow through the slots or perforates. Remarkably, attenuation can be achieved when the height of the ramp h is approximately two orders of magnitude smaller than the effective length L of the plate, i.e., $h/L \geq 0.025$.

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Date submitted: 26 Jul 2006 Electronic form version 1.4