

Abstract Submitted
for the DFD10 Meeting of
The American Physical Society

Investigation and Control of Flow-Induced Helmholtz Resonance

RUOLONG MA, SCOTT MORRIS, BRIAN CASTELLO, University of Notre Dame
— Grazing flow over the orifice of a Helmholtz resonator can result in a self excited resonance inside the cavity. A practical example is automotive sunroof buffeting. The resonance is generated by the vortical-acoustic coupling between the instability of the shear layer cross the orifice and the Helmholtz mode of the resonator. A simplified model was developed based on a control volume momentum analysis, which allows accurate predictions of both the frequency and amplitude of the cavity pressure fluctuations. The present study has specially focused on further understanding of the interaction between the forcing and the acoustic characteristics of the Helmholtz resonator to improve the model, as well as modification of the orifice geometry and exterior grazing flow to minimize the cavity pressure fluctuation.

Ruolong Ma
University of Notre Dame

Date submitted: 09 Aug 2010

Electronic form version 1.4