Abstract Submitted
for the DFD06 Meeting of
The American Physical Society

Flow-acoustic coupling in coaxial side branch resonators PETER OSHKAI, TING YAN, University of Victoria — Fully-turbulent flow over a coaxial deep cavity (side branch) resonator mounted in a duct is investigated using digital particle image velocimetry and unsteady pressure measurements. Interaction between the separated shear layers that form over the openings of the side branches is characterized in terms of instantaneous, phase- and time-averaged patterns of flow velocity, vorticity, streamline topology, and turbulence statistics. The effect of separated shear layer interaction on the generated acoustic power is investigated using calculated patterns of acoustic power production during several phases of the acoustic oscillation cycle. Generally speaking, the spatial structure of the acoustic source changes substantially as the interaction between the shear layers is increased. As the amplitude of the transverse flow oscillations increases, circulation of the large-scale vortical structures rapidly grows, and the region of the acoustic power production shifts upstream. Moreover, spatial structure and strength of the acoustic source also depend on the Strouhal mode of the separated shear layer oscillations.

Peter Oshkai
University of Victoria

Date submitted: 04 Aug 2006 Electronic form version 1.4