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Experimental Study of Acoustically-Coupled Cavity Flows: Effect of Resonator Geometry on the Acoustic Source Structure ALEXEY VELIKORODNY, PETER OSHKAI, University of Victoria — Digital particle image velocimetry in conjunction with unsteady pressure measurements is employed to investigate flow-acoustic coupling due to turbulent flow over coaxial deep cavities (side branches) mounted in a duct. Global, quantitative instantaneous and time-averaged flow patterns provide insight into the underlying physics. In addition, structure of the acoustic noise source is characterized in terms of patterns of generated acoustic power. A semi-empirical approach that involves numerical calculation of the acoustic (irrotational) velocity and experimental measurements of total velocity is employed for acoustic power calculation. The present study focuses on the effects of the resonator geometry on the associated flow patterns. Streamlined or bluff bodies placed in the vicinity of the side branch openings have significant influence on the degree of separated shear layer interaction. Moreover, Strouhal mode of the shear layer oscillations also has a significant effect on spatial structure and strength of the acoustic source.

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