

ACOUSTICS2008/1711 Adaptive closed-loop control of cavity flows

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Results from a combined experimental and computational study are presented on the development of an adaptive feedback controller for the suppression of cavity pressure loads. The experiments are performed in a variable-sized cavity in a high-speed wind tunnel, while the computations are performed using the CRAFT CFD flow solver. The adaptive control system incorporates recursive algorithms for system identification with disturbance rejection algorithms for feedback control. Results are presented using unsteady surface pressure sensors on the cavity walls and an array of zero-net mass-flux (ZNMF) actuators at the leading edge. The experimental data are used to compare with and validate the computations. These novel simulations form a virtual experiment testbed that is used to assess, for example, actuator type, placement, and requirements and also candidate identification and control algorithms.