ACOUSTICS2008/546
Experimental tests on smart panels for the reduction of sound radiation

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This paper presents a comparative experimental study carried out on four types of smart panels for the reduction of sound radiation. The four panels are equipped with decentralized velocity feedback control units that are designed to generate active damping. In this way the frequency averaged response and sound radiation produced by stochastic disturbances can be effectively reduced at low audio frequencies. The first smart panel is composed of a 4×4 array of square piezoelectric patch actuators with accelerometer sensors at their centres. The second smart panel is composed of sixteen triangularly shaped piezoelectric patch actuators with base edges evenly distributed along the perimeter of the panel and accelerometer sensors located on the top vertices of the actuators. The third panel is composed of five electro-dynamic inertial actuators with accelerometer sensors located under their footprints. The fourth panel is equipped with a light honeycomb trim panel mounted on four stiff mounts. A set of nine reactive electro-dynamic actuators is located in the shallow cavity between the two panels. Accelerometer sensors are mounted at the two footprints of each actuator. The sensor-actuator pairs mounted in the four panels are used to implement analogue local feedback loops.