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Reduction of Aerodynamic Noise Induced by Flow over a Cavity

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An experimental study to develop effective methods to reduce the aerodynamic noise induced by a turbulent flow over a cavity at low Mach numbers is carried out. It is shown that noise reduction can be achieved by both an active flow control method using piezo-ceramic devices and a passive control method inserting a thin plate into the cavity. In the active flow control case, it is shown that the piezo-ceramic actuators are capable of modifying the phase of the oscillatory flow fluctuation leading to noise suppression. It is also shown that for noise suppressing purposes, the passive method to simply insert a thin flat plate in to the cavity can be more effective. However, by carrying out the experiments in two different sized facilities, it is found that the sound suppressing efficiency depends on the scale of the flow field.

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