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Control of Flow Oscillations over a Cavity by Means of a Spanwise Cylinder

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This study deals with an experimental investigation of the passive control of a flow over a cavity. The control system is based on the introduction of a spanwise cylinder in the boundary layer upstream of the cavity. This simple device leads to elimination of the low frequency cavity tones. This suppression is related in the literature to the cylinder wake which forces at high frequency the shear layer over the cavity. The mean velocity profile is changed and the flow stabilized. The low frequency tones are replaced by low energy oscillations at the cylinder frequency. The aero-acoustic loop, which leads to the flow oscillations described by the Rossiter's model, is broken down by the cylinder wake whose dynamics does not feel the forcing by the cavity acoustics. The cylinder imposes its own dynamics to the mixing layer in a way we try to explain.

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