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Reduction of aerodynamic sound generated in a flow past an oscillating and a fixed cylinder in tandem YUJI HATTORI, Institute of Fluid Science, Tohoku University — The aerodynamic sound generated in a two-dimensional flow past an oscillating and a fixed circular cylinder in tandem is studied. This flow can be regarded as a simplified model of the sound generation due to the interaction of rotating wings and a strut. The sound pressure is captured by direct numerical simulation of the compressible Navier-Stokes equations using the volume penalization method modified by the author. It is shown that synchronization plays a crucial role in sound reduction. When the frequency of the oscillating cylinder is smaller than that of vortex shedding of the fixed cylinder, the sound is significantly reduced due to synchronization as the frequency of vortex shedding is decreased. Sound reduction also depends on the distance between the cylinders. There are distances at which the forces exerted on the cylinders are in anti-phase so that the total force and thereby the resulting sound are significantly reduced.

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