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Large eddy simulation of a cross-flow fan and its control[1]
MYUNGHWA KIM, BEOMJUN KYE, HAECHEON CHOI, Seoul National University — The flow characteristics of a cross-flow fan are investigated using large eddy simulation. The Reynolds number based on the blade chord length and the tip velocity at the outer radius of the fan is 5300. While the fan rotates, an eccentric vortex and a recirculation region are observed near the stabilizer and the rear guide, respectively. A through-flow region exists in between the eccentric vortex and recirculation region. To ana-lyze how the flow structures around the cross-flow fan affects the fan performance, the total pressure along the streamlines are examined. The flow separation and vortex shedding observed at the upstream region of the fan result in a considerable loss. To control this loss, a sinusoidal protrusion is applied to the leading edge of each blade. As a result, flow separation is reduced and the efficiency is increased.

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