

Abstract Submitted
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Characteristics of tip-leakage flow in an axial fan¹ KEUNTAE PARK, HAECHEON CHOI, Seoul Natl Univ, SEOKHO CHOI, YONGCHEOL SA, LG Electronics — An axial fan with a shroud generates complicated vortical structures by the interaction of the axial flow with the fan blades and shroud near the blade tips. Large eddy simulation (LES) is performed for flow through a forward-swept axial fan, operating at the design condition of $Re = 547,000$ based on the radius of blade tip and the tip velocity. A dynamic global model (Lee *et al.* 2010) is used for a subgrid-scale model, and an immersed boundary method in a non-inertial reference frame (Kim & Choi 2006) is adopted for the present simulation. It is found that two vortical structures are formed near the blade tip: the main tip leakage vortex (TLV) and the auxiliary TLV. The main TLV is initiated near the leading edge, develops downstream, and impinges on the pressure surface of the next blade, where the pressure fluctuations and turbulence intensity become high. On the other hand, the auxiliary TLV is initiated at the aft part of the blade but is relatively weak such that it merges with the main TLV.

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