

Shear Layer Investigation through a High-Load Cascade in Low-Pressure Gas Turbine Conditions

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Abstract : This paper deals with the steady and unsteady flow behavior on the separation bubble occurring on the rear portion of the suction side of T106A blade. The first phase was to implement the steady condition capturing the separation bubble. To accurately predict the separated region, the effects of three different turbulence models and computational grids were separately investigated. The results of Large Eddy Simulation (LES) model on the finest grid structure are acceptably in a good agreement with its relevant experimental results. The second phase is mainly to address the effects of wake entrance on bubble disappearance in unsteady situation. In the current simulations, from what was suggested in an experiment, simulating the flow unsteadiness, with concentrations on small scale disturbances instead of simulating a complete oncoming wake, is the key issue. Subsequently, the results from the current strategy to apply the effects of the wake and two other experimental work were compared to be in a good agreement. Between the two experiments, one of them deals with wake passing unsteady flow, and the other one implements experimentally the same approach as the current Computational Fluid Dynamics (CFD) simulation.

Keywords : low-pressure turbine cascade, large-Eddy simulation (LES), RANS turbulence models, unsteady flow measurements, flow separation

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