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**Compressible DNS study of separation bubbles for flow past a low pressure turbine blade**[1] RAJESH RANJAN, SURESH DESHPANDE, RODDAM NARASIMHA, JNCASR — A representative low pressure turbine blade T106A is subjected to a direct numerical simulation (DNS) study for low Reynolds Number (Re = 51831 based on inflow velocity and axial chord) and angle of incidence (45.5 deg from the axial chord). The DNS code used here solves the compressible Navier-Stokes equations and uses a semi-kinetic energy preserving scheme. A hybrid grid is used for the computational domain, with a very fine wall-bounded boundary layer grid near the surface of the blade and an unstructured grid for rest of the domain. Total grid size for the current simulation is around 160 million. In the mean flow, a long but shallow separation bubble is found near the trailing edge. However, the instantaneous flow reveals a train of bubbles at this location. These instantaneous bubbles continually break and merge in time. The presence of these separation bubbles make the flow very complicated, as the bubbles are responsible for tripping the otherwise laminar flow to a transitional state. Skin friction and heat transfer coefficient are also computed over the blade to understand the effect of these bubbles on parameters of engineering importance.

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