AERODYNAMICS OF TIP LEAKAGE FLOWS NEAR PARTIAL SQUEALER RIMS IN AN AXIAL FLOW TURBINE WITH AND WITHOUT WALL MOTION

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Abstract

The objective of present investigation is to study aerodynamics of tip leakage flows near partial squealer rims in an axial flow turbine cascade with and without end wall in motion. The reaction turbine blade used in the present investigations has a blade length of 400 mm and a geometric deflection of 82°. The blade chord is 102 mm with an aspect ratio of 3.9. The tip gap is maintained at 2% (2.04 mm) and the squealer rims were of 1.02 mm height. A total of seven cases were investigated with different squealer geometries including case without squealer rim. The coefficient of secondary loss coefficient (CSKE) is used as objective function. Minimum CSKE indicates minimum losses. From the investigations it is concluded that full suction side squealer rim is the optimum squealer geometry among all cases studied as CSKE was found to be minimum for this geometry. The optimum case was selected for wall motion studies. Three wall motions, namely; 75%, 100% and 125% of the inlet meridional velocity were maintained and investigated. The CSKE is reduced with all three end wall motions except very close to the end wall. The exit flow angle is reduced near the end wall as compared to no wall motion.

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