

STUDY OF FLOW 3D SEPARATION CHARACTERISATION IN ENDWALL BODY AIRFOIL ASYMMETRY BRITISH 9C7/22.5C50 BY THE ADDITION OF FORWARD FACING STEP TURBULATOR (FFST)

ABSTRACT

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3D flow separation phenomenon is a form of flow loss that can not be avoided in axial compressors. The occurrence of 3D flow separation on axial compressor due to the interaction between blade boundary layer with the hub-casing boundary layer which is located on endwall. This flow separation caused blockage effect and reduce pressure on the compressor. Horlock and Lakshminarayana mention of losses from the 3D flow donating 50% from total losses in the hydraulic axial compressor, while the energy losses caused by friction on annulus and the 2D separation in profile by 30% and 20%. Thus one of efforts to improve the efficiency from axial compressor can be accomplished by reducing losses due to 3D flow separation.

This study was performed experimentally and numerically to study the flow characteristics endwall body airfoil asymmetry british 9C7/22.5C50 by the addition of forward facing step turbulator (FFST) dan without FFST with variation *angle of attack* 0° , 8° , 12° , 14° and 16° . Experiments carried out to analyze the OFV that occurs at endwall body airfoil asymmetry with Reynolds number 1.64×10^5 . Numerical simulation using FLUENT 6.3.26 with models viscous of standard k-epsilon.

The results showed that the addition of FFST can increase the turbulent intensity in the region near wall, attachment line is not induced by the horseshoe vortex, so flow better able to follow the contours of the body. Consequently curling flow is weaker and wake more narrow and blockage (energy loss) can be reduction. Reduction of energy loss is most effective on angle of attack 8° at 7.36%.

Keywords: 3D flow separation, forward facing step turbulator (FFST), airfoil asymmetry 9C7 / 22.5C50