EXPERIMENTAL STUDY OF A VERY HIGH LIFT LOW PRESSURE TURBINE BLADE IN THE C1-LOW SPEED TUNNEL

Régis Houtermans, Belgique

Supervisors: T. Arts & T. Coton

This project deals with the characterisation of a new very high lift low pressure turbine blade developed at VKI. The upstream and downstream measurements were respectively done with a 4-hole naca probe and a 5-hole pressure probe. Pressure taps along the blade suction and pressure sides were used to determine the flow behaviour along the profile. Finally the turbulence characteristics, intensity and length scales, were determined with a single hot wire.

The influence of the Reynolds number and the incidence were investigated. By varying these two parameters, the evolutions of the losses, the mean outlet flow angle, the pressure coefficient and the secondary flows were determined. The combination of these results allowed the classification of the rear suction side bubbles. Finally, a model for separated flow mode of transition have been developed. The main advantage of this model is that it can be directly implemented for numerical simulations and is valid for all bubble types. For instance, two relations are represented on the figures here below.



Figure 1: Separation Reynolds number (left) and separation acceleration parameter (right) in function of the isentropic Reynolds number