

## INFLUENCE OF CASING TREATMENT GROOVES ON COMPRESSOR STABLE OPERATION RANGE

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### ABSTRACT

Casing treatment means such as grooves over a rotor blade tips extends a stable operation range of axial flow compressor, and improves its overall performances in some cases. There are presented the results of parametric investigation of grooves of traditional circumferential configurations.

Groove tests have been carried out with the stages of ten-stage subsonic axial compressor of the aviation engine for passenger liners. The investigations were performed at the special experimental test rig. Adiabatic head was measured with the help of total pressure combs before and after rotor cascade, theoretical head—with the help of torque measurement at pendulous stator. The experimental procedure used multiple measurements with corresponding statistical processing of test data. The accuracy of determination of stable operating range is estimated to be near 0.5% at a confidence level of 95%.

The influence of various geometrical parameters of grooves was tested. Pattern of typical circumferential groove geometry over a rotor blade was featured by number of grooves, three radial and five axial geometric dimensions. Changes of groove depth, groove solidity, inlet distance of groove location, and effective tip clearance were investigated.

Application of the Group Method of Data Handling (GMDH) has permitted to combine an influence of several geometric parameters on stable operating range in the form of one relationship.

Special calculations with the help of the developed model formula have permitted to estimate a degree of every parameter influence upon the final function—stable operating range.

**Keywords:** Compressor, stable operating range, casing treatment, model