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# Features of blade shape variation in the aerodynamic improvement of aircraft gas-turbine engine compressors

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This work is devoted to the development of procedures for the aerodynamic improvement of gas-turbine engine axial-flow compressor blade rows. The aim of the work is to compare the efficiency of two methods for impeller blade shape variation in the aerodynamic improvement of an aircraft gas-turbine engine two-stage fan. The first method consists only in varying the blade profile angle along the blade height, while the second consists in varying the blade profile angle and geometrical parameters. The features of the approach used in the solution of this problem are as follows: formulating quality criteria as the mean integral values of the power characteristics of each impeller of the fan over the operating range of the air flow rate through the impeller and searching for advisable values of the impeller blade parameters by scanning the independent variable range at points that form a uniformly distributed sequence of small length. The basic tool is a numerical method developed at the Institute of Technical Mechanics of the National Academy of Sciences of Ukraine and the State Space Agency of Ukraine, which simulates 3D turbulent gas flows in the compressor stage blade channels using the complete averaged Navier–Stokes equations. The results of multiparameter calculations of 3D turbulent gas flows show that at the initial stage of the aerodynamic improvement of compressor blade rows varying the blade profile angle alone is more efficient; however, increasing the number of elements of the uniformly distributed sequence of points in the variable range increases the possibility of finding a point at which the blade profile aerodynamic characteristics significantly improve. The results obtained are expected to be used in the aerodynamic improvement of gas-turbine engine compressor blade rows.

***Keywords:*** *aerodynamic improvement, blade shape variation, numerical simulation, power characteristics.*

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