

عنوان مقاله:

Numerical study on enhancement of low speed axial compressor rotor performance under radial inlet distortion via DBD plasma actuators

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نویسندگان:

Ali Khoshnejad - Faculty of Aerospace Engineering K.N.Toosi University of Technology

Reza Ebrahimi - Faculty of Aerospace Engineering K.N.Toosi University of Technology

Gholamhosein Pouryossefi - Faculty of Aerospace Engineering K.N.Toosi University of Technology

خلاصه مقاله:

Aero-engine entrance conditions are not always ideal and, for various reasons, inlet distortion may occur and cause inlet blockage and reduction of compressor performance. The aim of this study was to numerically simulate the effects of plasma actuators on the enhancement of low-speed axial compressor rotor performance under radial inlet distortion. First, compressor performance under radial inlet distortion with ۱۵% and ۲۰% blockage and their destructive effects on stall margin was investigated. Then, the effect of plasma actuators on rotor loss subjected to inlet distortion was investigated, using an algebraic model based on the plasma actuators physics in form of body force distribution in Navier-Stokes equations. The results show that radial inlet distortion causes decreasing stall margin of the compressor. In addition, according to the findings, applying plasma actuators boosts the flow momentum behind the distortion screen and reduces the blockage of the rotor tip region, leading to decreasing losses. Furthermore, at ۱۵% blockage, the plasma actuators caused to increase the stall margin from -۱۱% to -۵% versus the rotor in clean condition.

کلمات کلیدی:

Axial Compressor, Inlet distortion, plasma actuator, Active flow control, Stall Margin

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