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Calculation Analysis of an Axial Compressor Supersonic Stage Impeller

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Abstract : There is an evident trend to elevate pressure ratio of a single stage of a turbo compressors - axial compressors in particular. Whilst there was an opinion recently that a pressure ratio 1,9 was a reasonable limit, later appeared information on successful modeling tested of stages with pressure ratio up to 2,8. The Authors recon that lack of information on high pressure stages makes actual a study of rational choice of design parameters before high supersonic flow problems solving. The computer program of an engineering type was developed. Below is presented a sample of its application to study possible parameters of the impeller of the stage with pressure ratio π*=3,0. Influence of two main design parameters on expected efficiency, periphery blade speed and flow structure is demonstrated. The results had lead to choose a variant for further analysis and improvement by CFD methods.

Keywords : supersonic stage, impeller, efficiency, flow rate coefficient, work coefficient, loss coefficient, oblique shock, direct shock
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