

Aerodynamic Designing of Supersonic Centrifugal Compressor Stages

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Abstract : Universal modeling method well proven for industrial compressors was applied for design of the high flow rate supersonic stage. Results were checked by ANSYS CFX and NUMECA Fine Turbo calculations. The impeller appeared to be very effective at transonic flow velocities. Stator elements efficiency is acceptable at design Mach numbers too. Their loss coefficient versus inlet flow angle performances correlates well with Universal modeling prediction. The impeller demonstrated ability of satisfactory operation at design flow rate. Supersonic flow behavior in the impeller inducer at the shroud blade to blade surface Φ_{des} deserves additional study.

Keywords : centrifugal compressor stage, supersonic impeller, inlet flow angle, loss coefficient, return channel, shock wave, vane diffuser

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