Design Optimization of Centrifugal Compressor Impeller

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Abstract
A tool for centrifugal compressor impeller multi-objective design optimization was developed. It combines genetic algorithm optimizer with 3-D viscous fluid solver. The constraints on the optimization process were to keep the same mass flow rate and rpm, while limiting the torque violation to 1% maximum (to not disturb the turbine operation). A measure for the flow reversal in the impeller was introduced, which could be used as a tool for impeller stall prediction. A definition for measuring the heterogeneity of the impeller exit velocities was introduced, and used as a mean to improve the on-design conditions, and the stall characteristics.

Keywords
CFD, Centrifugal Compressor, Impeller,