

A Comparison of Design and Off-Design Performances of a Centrifugal Compressor

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Abstract : Today, as the need for high efficiency and fuel-efficient engines have increased, centrifugal compressor designs are expected to be high-efficient and have high-pressure ratios than ever. The present study represents a design methodology of centrifugal compressor placed in a mini jet engine for the design and off-design points with the utilization of computational fluid dynamics (CFD) and compares the performance characteristics at the mentioned two points. Although the compressor is expected to provide the required specifications at the design point, it is known that it is important for the design to deliver the required parameters at the off-design point also as it will not operate at the design point always. It was observed that the obtained mass flow rate, pressure ratio, and efficiency values are within the limits of the design specifications for the design and off-design points. Despite having different design inputs for the mentioned two points, they reveal similar flow characteristics in the general frame.

Keywords : centrifugal compressor, computational fluid dynamics, design point, off-design point

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