

Surge Characteristics of Centrifugal Compressors with IGV's

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ABSTRACT

The performance of single-stage, high-speed centrifugal compressors is largely dictated by the characteristics and matching of three components, the inlet guide vanes (IGV's), impeller, and diffuser. The manner in which these three components interface is discussed, followed by an examination of the effectiveness of variable inlet guide vanes to control the compressor surge characteristics, as dependent upon the impeller eye to tip diameter ratio ϵ , Laval number, and the type of diffuser, vaneless or vaned. Test performances of two moderately high pressure ratio centrifugal compressors with IGV's are presented to verify that surge characteristics of vaned diffuser compressors may, or may not, respond to prewhirl as dependent impeller and diffuser stability characteristics.

Keywords: Centrifugal Compressor, Inlet Guide vanes, Surge Characteristics