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A.C. Plasma Anemometer for Axial Compressor Stall Warning ERIC MATLIS, JOSHUA CAMERON, SCOTT MORRIS, THOMAS CORKE, University of Notre Dame — Compressor sections of turbo jet engines are subject to stall and surge as a result of flow instabilities that occur upstream of the compressor rotor. One of the instability modes that contributes to compressor surge is the so-called 'spike' mode of stall inception. It has been shown that this mode of instability can be predicted before onset by performing real-time statistical auto-correlation measurements of the blade-passing pressure characteristic at the mid-chord location of the rotor. These measurements are performed with pressure sensors or hot-wires that are too fragile for a full-scale compressor. We have developed a sensor that can survive the vibration and temperatures of a full-scale rig while providing the bandwidth necessary to resolve the blade passage signature required by this coherence technique. This sensor, called the Plasma Anemometer, provides high-bandwith point measurements of velocity or pressure fluctuations with unparalleled mechanical robustness and resistance to vibration and thermal effects.

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