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in On-Site Station-Performance Measurement and Diagnostics

An acoustic-impedance probe has been developed for the purpose of on-site evaluation of pipe-based wind-noise-reduction systems (WNRS) and microbarometers. The probe generates a controlled volume displacement using a precision graphite-in-glass piston. The displacement is measured with a linear variable-displacement transformer (LVDT) and the acoustic pressure is measured with a DC-coupled pressure transducer. The magnitude and phase of the acoustic impedance is calculated from the measured volume displacement and pressure. If an arm of a WNRS is disconnected from the microbarometer and the probe attached to the WNRS, the impedance can be measured. Even a single inlet-blockage in a 24-pipe rosette arm can be detected by the change in impedance. In addition to measurement of acoustic impedance, the probe can be used to drive the microbarometer directly thereby performing a field calibration of that microbarometer. Both modes of operation were demonstrated at the Sandia National Laboratory Facility for Acceptance, Calibration, and Testing (FACT). In this demonstration, the probe was used with two varieties of WNRS with artificially introduced faults. The probe was also used to measure the magnitude and phase of the frequency response from 0.03 to 0.5 Hz of a microbarometer in the field.
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