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in reciprocity calibration of infrasound sensors

Reciprocity calibration is a well-established primary calibration technique, a technique that does not require an independently-calibrated acoustic reference. In its most general form, reciprocity requires two transducers in addition to the sensor being calibrated; however, the responses of these transducers do not need to be known. The transmitting and receiving responses of the two reciprocal transducers and the receiving response of the sensor are derived from voltage-to-current ratio measurements, by physical characteristics of the apparatus—volume, surface area, and electrical resistance, for example—and physical characteristics of the air inside the apparatus. The calibration chamber, designed and built by the National Center for Physical Acoustics at the University of Mississippi, then modified and operated by Sandia National Laboratories, incorporates commercial moving-coil loudspeakers as the reciprocal transducers. These loudspeakers are attached to a closed volume containing the sensor under test. This presentation describes measurement of the magnitude and phase response over frequency of several infrasound sensors using the reciprocity-based calibration procedure. The dominant sources of uncertainty and auxiliary measurements used to verify proper operation are described.

Primary author: GABRIELSON, Thomas (Penn State University)

Presenter: GABRIELSON, Thomas (Penn State University)

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