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Characterization of the embedded tubing response for flush-mounted pressure scanners MICHAEL HIND, POURYA NIKOUEEYAN, JOHN STRIKE, Resono Pressure Systems, JONATHAN NAUGHTON, University of Wyoming, MATZ DAHLAND, STEVEN KEETER, Measurement Specialties, Inc., a TE Connectivity company — In recent years, the demand for using pressure scanning modules for unsteady aerodynamic measurements has increased. The advent of additive manufacturing has enabled the design and utilization of pressure scanners mounted directly in the test model resulting in a reduction of the pneumatic tubing length. While this decreased tubing length can minimize the attenuation and latency that arise from friction in tubing, the pneumatic resonance can still distort the acquired pressure signal. Although previous work has shown the capabilities and limitations of Weiner deconvolution in reconstructing the surface pressure from the measured pressure at the end of a long tube, very little work has considered characterizing the short, complex geometry pneumatic tubing systems created with additive manufacturing. In this work, the dynamic response of different embedded pneumatic tubing configurations routed to a flush mounted pressure scanner are studied. The dependency of different distortions on the geometry of the embedded tubing system is studied, and the performance of Weiner deconvolution reconstruction is evaluated. Sources of random and bias error along with the uncertainty associated with the Weiner deconvolution are also considered and quantified.

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