

Abstract Submitted
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Inferring Pre-shock Acoustic Field From Post-shock Pitot Pressure Measurement JIAN-XUN WANG, Virginia Tech, CHAO ZHANG, LIAN DUAN, Missouri Univ of Sci Tech, HENG XIAO, Virginia Tech, VIRGINIA TECH TEAM, MISSOURI UNIV OF SCI TECH TEAM — Linear interaction analysis (LIA) and iterative ensemble Kalman method are used to convert post-shock Pitot pressure fluctuations to static pressure fluctuations in front of the shock. The LIA is used as the forward model for the transfer function associated with a homogeneous field of acoustic waves passing through a nominally normal shock wave. The iterative ensemble Kalman method is then employed to infer the spectrum of upstream acoustic waves based on the post-shock Pitot pressure measured at a single point. Several test cases with synthetic and real measurement data are used to demonstrate the merits of the proposed inference scheme. The study provides the basis for measuring tunnel freestream noise with intrusive probes in noisy supersonic wind tunnels.

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