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Causality in the shock-wave/turbulent boundary layer interaction KENZO SASAKI, ANDRÉ VALDETARO GOMES CAVALIERI, Instituto Tecnológico de Aeronáutica, Brazil, DIOGO CAMELLO BARROS, LIONEL LARCHEVÊQUE, Aix-Marseille Université, CNRS, IUSTI, Marseille, France — The present work tackles the study of the unsteady behaviour of an impinging oblique shock and its interaction with a Mach 2 turbulent boundary layer. The investigation is made through the large-eddy simulation presented in Jiang *et al.*, 2017, which has been extensively validated against experimental data. The main objective is to track the causes of the low-frequency fluctuations within the interaction zone, leading to the unsteadiness of the shock foot position. Evaluation of the spectrum in this region indicates that it is dominated by two-dimensional fluctuations which can be isolated via averaging in the spanwise direction. Data-driven approaches such as empirically derived transfer functions and spectral proper orthogonal decomposition (SPOD) are then performed in the averaged flow field. The results indicate the existence of a feedback mechanism between downstream fluctuations and the shock motion. Furthermore the leading SPOD mode comprises upstream travelling waves and enables the reconstruction of a significant portion of the energy of the shock motion from downstream measurements only. The current results indicate that downstream fluctuations are the driving mechanism behind the unsteady shock fluctuations.

KENZO SASAKI
Instituto Tecnológico de Aeronáutica, Brazil

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