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Space-time measurements in a shock wave/turbulent boundary layer interaction[1] ANNE-MARIE SCHREYER, Aix-Marseille Universite, CNRS, IUSTI UMR 7343, Marseille / Centre National d'Etudes Spatiales CNES, DLA, Paris, PIERRE DUPONT, Aix-Marseille Universite, CNRS, IUSTI UMR 7343, Marseille, France — We study a reflected shock interaction with separation at Mach 2, contributing to a better understanding of rocket engine nozzle flows. The flow field contains a wide range of characteristic frequencies between $O(100)$Hz for the oscillation of the reflected shock and $O(100)$kHz for the turbulent microscales. To explain the origin and interdependence of the physical phenomena in the interaction, we need access to the spatio-temporal links. We thus require a measurement technique allowing the resolution of the entire frequency range while also providing sufficient spatial resolution and a large field of view. Our newly developed Dual-PIV system satisfies these requirements. First measurements with this system in an interaction flow field were performed in the continuous hypo-turbulent wind-tunnel at IUSTI at a momentum thickness Reynolds number of $Re_\theta = 5024$ and a deflection angle of $\theta = 8.75°$. We present a detailed characterization of the flow field including turbulence measurements. From measurements at a range of temporal delays, we determined autocorrelations at crucial points in the flow field (incoming boundary layer, mixing layer, relaxation zone). From these, spatio-temporal information like the integral scales and the convection velocity are deduced.

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