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Abstract Submitted
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LES of shock wave/turbulent boundary layer interaction affected by microramp vortex generators LAURENT JOLY, ARNAUD GREBERT, STPHANE JAMME, JULIEN BODART, Institut Suprieur de l'Aronautique et de l'Espace, Universit de Toulouse, AERODYNAMICS, ENERGETICS AND PROPULSION DEP. TEAM — At large Mach numbers, the interaction of an oblique shock wave with a turbulent boundary layer (SWTBLI) developing over a flat plate gives rise to a separation bubble known to exhibit low-frequency streamwise oscillations around $St_L = 0.03$ (a Strouhal number based on the separated region length). Because these oscillations yield wall pressure or load fluctuations, efforts are made to reduce their amplitude. We perform large eddy simulations to reproduce the experiments by Wang et al (2012) where a rake of microramp vortex generators (MVGs) were inserted upstream the SWTBLI with consequences yet to be fully understood. There is no consensus on the flow structure downstream MVGs and this is first clarified in the case of MVGs protruding by 0.47δ in a TBL at Mach number $M = 2.7$ and Reynolds number $Re_\theta = 3600$. Large-scale vortices intermittently shed downstream the MVGs are characterized by a streamwise period close to twice the TBL thickness and a frequency $f \approx 0.5U_e/\delta$, two orders of magnitude higher than the one of the uncontrolled SWTBLI. We then characterize the interaction between the unsteady wake of the MVGs with the SWTBLI resulting in the reduction of the interaction length and the high-frequency modulation of the shock feet motions.

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