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Shock wave Boundary layer interaction in supersonic flow over a forward-facing step JAYAPRAKASH NARAYAN M., RAGHURAMAN GOVARDHAN, Indian Institute of Science — Shock wave boundary layer interactions (SWBLI) are known to result in low-frequency large-scale shock oscillations, the origin of which has been a subject of debate. Motivated by this debate, we study in the present work, the SWBLI in supersonic flow over a Forward-Facing Step (FFS) at a Mach number of 2.5. The FFS configuration, which consists of a 90 degree step of height h, may be thought of as an extreme case of the compression ramp geometry, with the main geometrical parameter here being (h/δ) (δ is the boundary layer thickness). This configuration is less studied and has some inherent advantages for experimentally studying SWBLI as the size of the separation bubble is large. In the present experimental study, we use high-speed schlieren and PIV measurements to help understand the features of SWBLI in the forward-facing step case. PIV measurements show a clear time-averaged separation bubble ahead of the step, with very large variations of the separation bubble in time. From instantaneous PIV velocity fields, a number of features are extracted including size of the separation bubble and the shock location, to comment on their variations in time, and to determine correlation coefficients.

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