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Experimental investigation of compressibility effects in a separated boundary layer in supersonic flow JEAN-PAUL DUSSAUGE, IUSTI / Univ. Aix-Marseille / CNRS UMR 6595, SÉBASTIEN PIPONNIAU, Institut Pprime, PIERRE DUPONT, IUSTI / Univ. Aix-Marseille / CNRS UMR 6595 —
The structure of the mixing layer formed at the edge of a separation bubble, in a supersonic boundary layer subjected to an impinging oblique shock wave is explored experimentally. An estimation of the spreading rate, based on PIV measurements of velocity variance is proposed. It is shown that, in spite of the rather high convective Mach number produced in the separated zone, the rate of spread of the mixing layer is quite large. It is checked this is only the result of the orientation of the layer with respect to the surrounding flow: this increases significantly the mass entrainment. Moreover, it is shown that the resulting level of turbulent friction is just adapted to this spatial growth rate. It is concluded that, as a first approximation, the behavior of this shear layer follows the physics of the canonical compressible mixing layer.

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