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**Mixing enhancement strategies and their mechanisms in supersonic flows: A****brief review**

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**Abstract:** Achieving efficient fuel-air mixing is a crucial issue in the design of the scramjet engine due to the compressibility effect on the mixing shear layer growth and the stringent flow residence time limitation induced by the high-speed crossflow, and the potential solution is to enhance mixing between air and fuel by introducing of streamwise vortices in the flow field. In this survey, some mixing enhancement strategies based on the traditional transverse injection technique proposed in recent years, as well as their mixing augmentation mechanisms, were reviewed in detail, namely the pulsed transverse injection scheme, the traditional transverse injection coupled with the vortex generator, and the dual transverse injection system with a front porthole and a rear air porthole arranged in tandem. The streamwise vortices, through the large-scale stirring motion that they introduce, are responsible for the extraction of large amounts of energy from the mean flow that can be converted into turbulence, ultimately leading to increased mixing effectiveness. The streamwise vortices may be obtained by taking advantage of the shear layer between a jet and the cross stream or by employing intrusive physical devices. Finally, a promising mixing enhancement strategy in supersonic flows was proposed, and some remarks were provided.

**Keywords:** Mixing enhancement; supersonic flow; vortex generator; pulsed injection; transverse

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