

Abstract Submitted
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Characteristics of Turbulent/non-turbulent Interface in a Turbulent Planar Jet with a Chemical Reaction¹ TOMOAKI WATANABE, Nagoya University, JSPS Research Fellow, YASUHIKO SAKAI, KOUJI NAGATA, OSAMU TERASHIMA, YASUMASA ITO, Nagoya University, TOSHIYUKI HAYASE, Tohoku University — Characteristics of chemical reaction ($A + B \rightarrow P$) near the turbulent/non-turbulent (T/NT) interface are investigated by using the direct numerical simulation of reactive planar jet. The reactants A and B are separately premixed into the jet and ambient flows, respectively. DNS is performed at three different Damköhler numbers. The conditional statistics conditioned on the distance from the T/NT interface is used to investigate the chemical reaction near the T/NT interface. The conditional mean concentration of product P shows a sharp jump near the T/NT interface, and the product P hardly exists in the non-turbulent region. This implies that the chemical reaction takes place in the turbulent region after the reactant B in the ambient flow is entrained into the turbulent region. The conditional mean scalar dissipation rate of mixture fraction has a large peak value slightly inside the T/NT interface. At the same point, the chemical reaction rate also has a peak value in the case of large Damköhler number. On the other hand, when the Damköhler number is small, the chemical reaction rate near the T/NT interface is smaller than that in the turbulent region.

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