

Abstract Submitted
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3D Flame and Eddy Structures of Turbulent Plane Jet Premixed Flame MASAYASU SHIMURA, KOMEI YAMAWAKI, NAOYA FUKUSHIMA, YOUNGSAM SHIM, MAMORU TANAHASHI, TOSHIO MIYAUCHI, Tokyo Institute of Technology — 3D DNS of hydrogen-air turbulent plane jet premixed flames, which are composed of high-speed unburnt gas and surrounding burnt gas, have been conducted. Fully-developed homogeneous isotropic turbulence is superimposed on the high speed mean flow under the assumption that a turbulence grid is installed in the upstream. A detailed kinetic mechanism including 12 species and 27 elementary reactions is considered and 0.228 billion grid points are used. Eddy structures which have large scale in space and streamwise rotating axis are produced along the outer edge of OH layer in burnt gas. These streamwise eddies are induced by velocity difference due to strong expansion of the burnt gas. Although combustion condition of the present DNS is classified into corrugated flamelets regime, unburnt mixture islands frequently appear behind the main flame. The creation of these islands is closely related to the fine scale eddies in the unburnt turbulence and the separated unburnt mixture is consumed rapidly by the heating from surrounding burnt gas.

Masayasu Shimura
Tokyo Institute of Technology

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