

**Measurement of instantaneous 2-D velocity field and local chemiluminescence in a premixed-spray flame
by PIV and MICRO system**

by

Shohji TSUSHIMA*, Masaaki NEGORO*, Hiroyasu SAITOH*
Manabu FUCHIHATA**, Fumiteru AKAMATSU* and Masashi KATSUKI*

*Department of Mechanical Engineering, Osaka University
2-1 Yamada-oka, Suita, Osaka 565-0871 JAPAN

**Department of Mechanical Engineering, Kinki University
3-4-1 Kowakae, Higashi-Osaka, Osaka 577-8502, JAPAN

ABSTRACT

In this article, combined measurements of particle image velocimetry (PIV) and Multi-colour Integrated Cassegrain Receiving Optics (MICRO) are demonstrated in an attempt to investigate characteristics of propagating flame in a premixed-spray stream. The cross-correlation PIV system consisting of an Argon-ion laser and a CCD camera with an image intensifier showed its capability to provide instantaneous two-dimensional (2D) velocity fields in sooty spray flames as shown in Fig.1, where liquid fuel of kerosene was supplied in the form of premixed-spray. It enabled us to give a more detailed interpretation of the influence of fluid turbulent motion on the process of *preferential* flame propagation. Furthermore, local chemiluminescences in flames detected by MICRO system were conditionally processed in terms of the distance from spray boundary that was calculated from the visualized spray images. The obtained one-dimensional flame structure in the direction of flame propagation showed that two distinct reaction peaks appeared on both side of the main vaporization region.

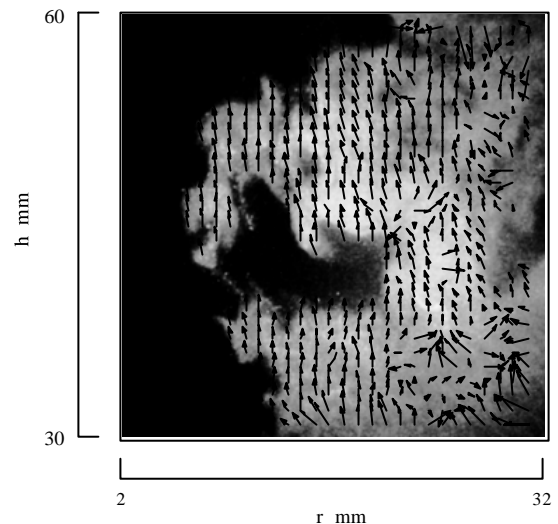


Fig.1 2-D velocity fields with spray