

Paper 2.4

Comparison of PIV and SPIV in Application to Industrial Spray Burner Virginia Palero, Yuji Ikeda, Tsuyoshi Nakajima

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ABSTRACT

The purpose of this paper is to investigate and evaluate Stereoscopic PIV (SPIV) in spray measurements. The system studied here is a gun-type burner (figure 1) used for practical industrial oil furnaces of 0.1 MW and spray measurement is done under no reacting condition. The SPIV angular displacement method has been implemented. Several parametric studies have been done in order to optimize the most suitable stereoscopic angle for our particular set-up (22.5°) and also to estimate SPIV accuracy.

SPIV has been compared with PDA (SMD and size-classified PDA) showing good agreement specially between SPIV data and PDA velocities obtained for particles smaller than 30 μm . Figure 2 shows the swirl component contours obtained with both techniques.

In-plane velocity components obtained with PIV are affected by an error because of the out-of-plane component. Therefore, SPIV will provide, not only the out-of-plane component, but also will correct the in-plane components. In this paper SPIV has been compared also with PIV in order to determine the magnitude of this correction. SPIV corrects the in-plane velocity components in a 10% of the maximum measured velocity.

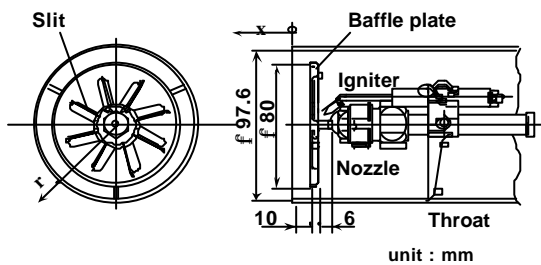


Figure 1 Gun-type burner

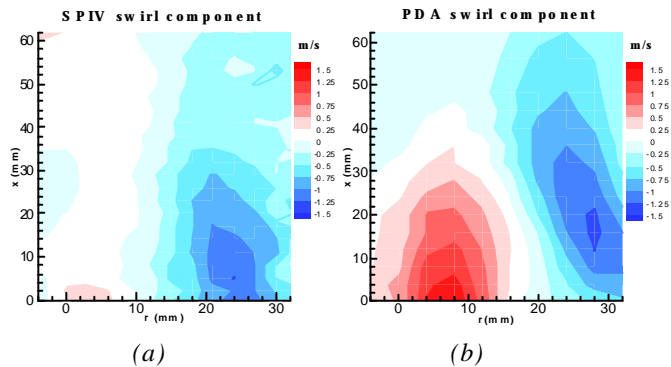


Figure 2 Swirl component contours obtained by: (a) SPIV, (b) PDA