

Thickness Measurement of Liquid Sheet Spray before Breakup

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Abstract

This paper presents the thickness measurement of liquid sheet spray. Two types of liquid sheet spray were measured, i.e. the wall impingement spray and flat spray. The measurement was carried out by a light absorption method using He-Cd laser and diode laser. Figure 1 shows the experimental apparatus in this study. Moreover, the thickness change of the flat spray prior to the breakup point was further clarified from the movement of 4-points of photochromic dye traces by using laser tagging method (See Fig. 2). In other words, the thickness data both from the light absorption method and laser tagging method was compared to clarify the characteristics of the breakup phenomena of liquid sheet. As can be seen in Fig. 3, there were two kinds of thickness change for both sprays. The first one shows the decreasing trend up until the breakup point. Another kind of change was the increasing trends of the thickness after having the decreasing trend. The reason for these phenomena can be attributed to the ligament formation in the liquid sheet as shown in the Fig. 4. In other words, the increasing trend represents the moment when the 4-points of dye traces accumulated into the ligament, while the decreasing trends indicates the moment when the dye traces were located in between two ligaments. Therefore, the change of liquid sheet thickness between two ligaments can be clarified by the laser tagging method, which is normally difficult to be achieved by using the light absorption method.

Keywords: Thickness Measurement, Liquid Sheet, Breakup, Laser Tagging Method, Light Absorption Method

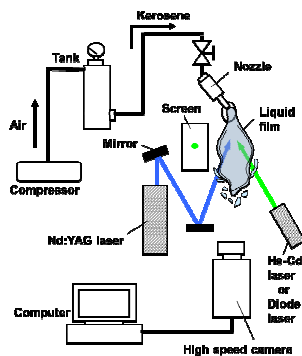


Fig. 1 Experimental apparatus

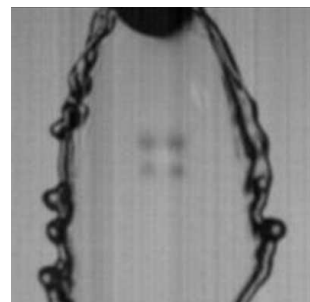


Fig. 2 4-points of photochromic dye traces

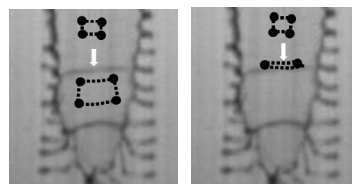
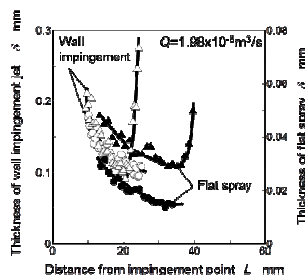


Fig. 3 Thickness change of liquid sheet spray Fig. 4 Change of dye traces against ligament formation