

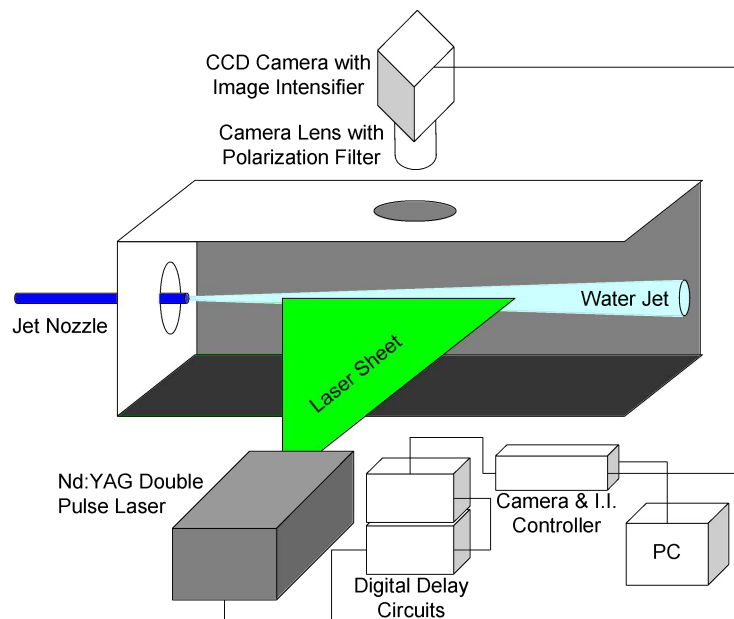
Velocity Measurements Technique of High Pressure Water Jet by High Speed PIV

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The high pressure water jet is utilized in various industrial application such as cutting various materials and soil. In particular, the jet grouting for the soil improvement is one of the most important application of water jet under high pressure and high liquid flow rate. In the practical use of the water jet grouting, the water pressure is very high, reaches up to 30 ~ 200 MPa, and sometimes the jet velocity exceeds the supersonic. The nozzle diameter of the jet is several millimetre, so the jet has quite high flow rate. Because of this, the hydrodynamic structure of the water jet is very complicated. In order to improve the efficiency and the performance of the jet grouting, it is quite important to clarify the hydrodynamic structure of water jet under high pressure and high flow rate. However, the fundamental researches on this subject are quite insufficient both analytically and experimentally. In particular, the detailed velocity measurements for the water jets with high velocity and high flow rate have almost not been carried out because of its technical difficulty. However, the velocity measurement technique such as high speed PIV has made tremendous progress in recent years. The high-wattage double-pulse Laser equipment as a light source and supersensitive CCD photo detector with image intensifier and with fast shutter gate make it possible to capture precisely a couple of pictures of the high speed water jet. In this study,



the high speed PIV measurement system was constructed.

Fig.1 Schematic drawing of experimental setup for high speed PIV