§7. Study of the Fueling Pellet Transportation in the Guiding Tube

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In recent fusion researches, a hydrogen ice pellet injection is an indispensable method for fueling to plasmas. A measurement of pellet parameters (velocity, mass and shape) just before injection to the plasma is important for evaluation of the fueling efficiency and the transport efficiency (the loss of the pellet velocity and mass) through the guiding tube. However the mechanisms of the pellet transformation in the guiding tube have been not yet clear. We developed a new diagnostic system for a pellet size, speed and shape, simultaneously.[1-2] We have developed a new diagnostic system in order to study a pellet transformation in a guiding tube. Figure 1 shows a schematic diagram of a pellet reflection measuring system for studying the pellet transformation in the guiding tube. The system consists of three parts. They are: light gate systems, a pellet reflected section on the steal plate, and a position detecting shadowgraph systems. This system provides the pellet reflection angle, velocity and shape change by the reflection on the stainless plate, simultaneously.

Moreover, we tried to produce the sub-millimeter sized pellet for studying the pellet transformation in the guiding tube in the GAMMA 10 pellet injection system. We succeeded to make pellet of 0.4 mm in diameter for detailed density control of the GAMMA 10 plasma.

Reference
1) Yoshikawa, M., et al. ; Annual Report of NIFS, April 2003-March 2004 (2004) 98.
2) Yoshikawa, M., et al. ; Annual Report of NIFS, April 2004-March 2005 (2005) 202.

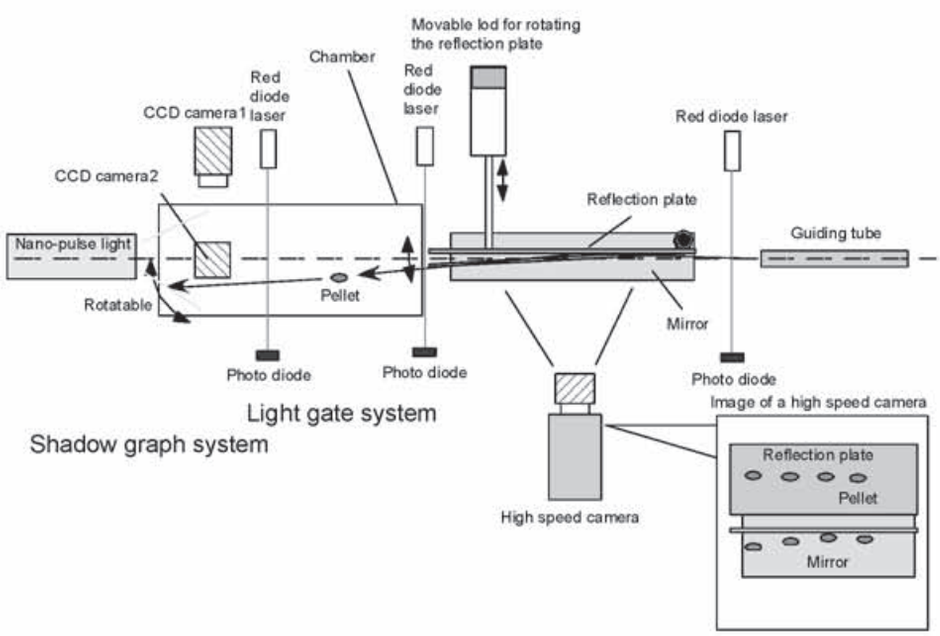

Figure 1: Schematic diagram of the pellet reflection measuring system for studying the pellet transformation in the guiding tube.

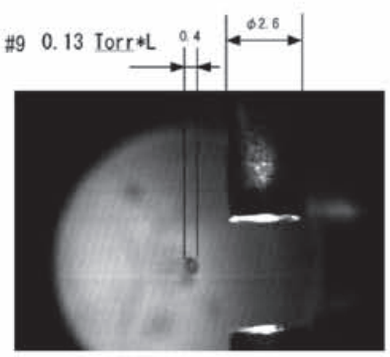

Figure 2: A sub-millimeter sized pellet produced for GAMMA 10 plasma fueling.