

§2. 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 integrated diagnostic system for a pellet size, speed and shape, simultaneously.¹⁻²⁾ Figure 1 shows the measured signals of the light gate system in the first pellet diagnostic system (a), signals of the microwave mass measuring system and the light gate systems in the new integrated pellet diagnostic system (b, c) on the GAMMA 10 sub-millimeter pellet

experiments. Figure 1 (c) shows detail of the time dependences of the pellet signals. The pellet speed was 620 m/s at the first pellet diagnostic system, and after the transportation of 6.5 m Teflon guiding tube the pellet speed is about 480 m/s. Moreover, Fig. 1 (b) shows that the pellet was broken to three or four pieces. It was shown in the picture of the pellet shadowgraph (Fig. 2 (b)). In Fig. 2 (a) shows the pellet shadowgraph in the first pellet diagnostic system. Then this new integrated pellet diagnostic system can provide detailed study of pellet transport in the guiding tube.

We try to measure the pellet size, speed, and the reflection angle after reflection by the reflection plate in the pellet reflection measurement system which we had constructed in order to construct the model of pellet transportation in the guiding tube.

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.

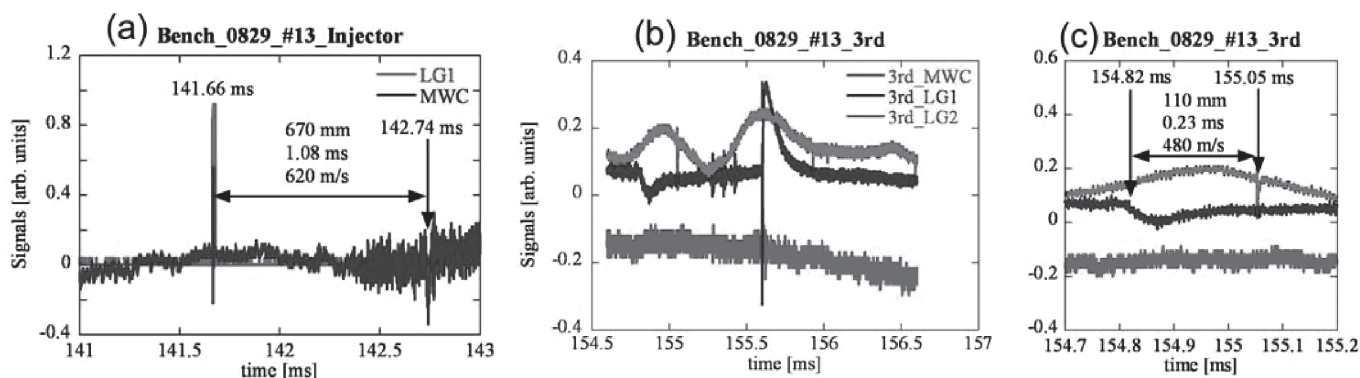


Fig. 1: (a) shows the measured signals of the light gate system in the first pellet diagnostic system (a), signals of the microwave mass measuring system and the light gate system in the new integrated pellet diagnostic system (b, c).

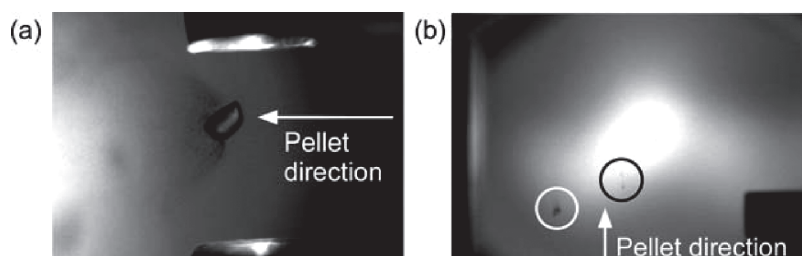


Fig. 2: (a) and (b) show the pellet shadowgraph in the first pellet diagnostic system and the third pellet diagnostic system, respectively.