

§1. Behavior of the Fueling Pellet in the Guiding Tube

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In fusion plasmas, it is difficult to fuel by the gas puffing because of their high temperatures. Then the pellet injection technique is useful to make fueling in the core region of the fusion plasmas. To make pellet fueling at each position, we have to use the guiding tube to transfer the pellet from pellet injector to the fusion device. However, the behavior of the pellet in the guiding tube have not been clearly understood, yet. Then we tried to measure the behavior of the pellet in the guiding tube with measuring the pellet reflection angle and speeds by using the high speed camera. We used the pellet reflection measurement system made by the NIFS LHD collaboration program. We used the high repetition pellet injector in NIFS. The pellet reflection measurement system consists of stainless steel reflection plate of pellet, high speed camera and shadowgraph system. We changed the pellet incident angle with changing the reflection plate angle. The high speed camera can measure 10000 fps. We tried to measure over 30 pellet injection, however there are only 2 pellet injection shot which we can clearly obtain the pellet

reflection images. In Fig. 1 we show the images with pellet injection angle of 86.91 degree with the velocity of 61.32 m/s. In that case, the reflection angle was 86.88 degree and after reflection velocity was about 55.90 m/s. When the incident angle and incident velocity were about 86.92 degree and 43.40 m/s, respectively, the reflected angle and reflected velocity were 86.86 degree and 28.17 m/s, respectively. The pellet incident angle were almost the same against changing the reflection plate angle, because the pellet emittance at the out put of guiding tube. However, we could successfully measured the reflection data to construct the pellet behavior model in the guiding tubes of the pellet at the reflection plate. Then we will try to measure the more detailed data of the reflection of the pellet in the guiding tube in order to construct the model of behavior of the pellet in the guiding tube.

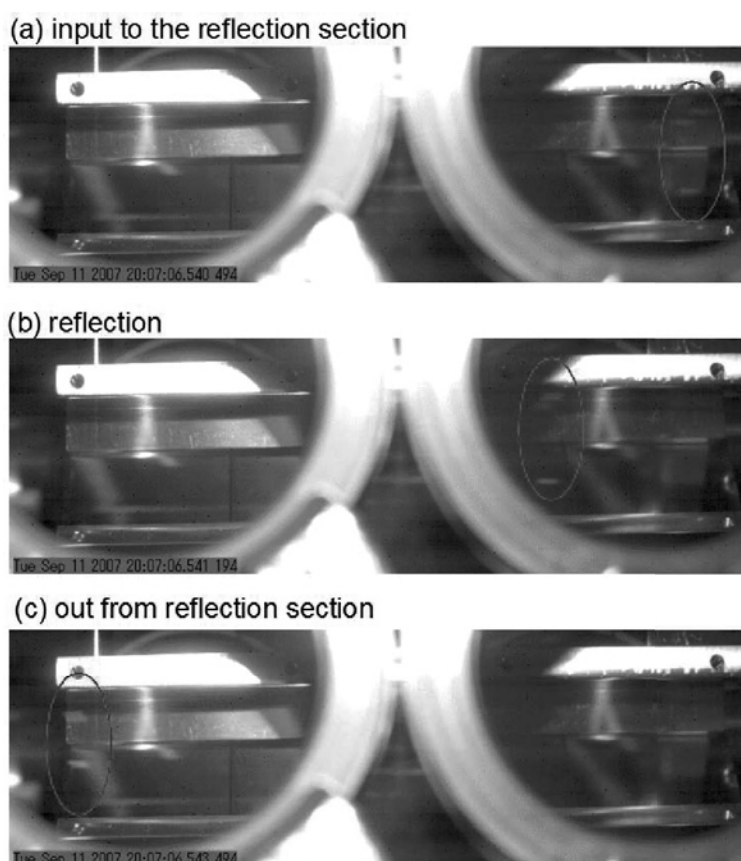


Fig. 1: Pellet reflection image on the pellet reflection plate. (a) shows at the time of pellet incident at the reflection measuring stage, (b) shows the just time of reflecting region at the plate, and (c) shows pellet at the exit region.