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EXPERIMENTAL STUDY OF PELLET DELIVERY TO THE ITER INNER WALL THROUGH A CURVED GUIDE TUBE AT STEADY-STATE PRESSURE*

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Injection of solid hydrogen pellets from the magnetic high-field side will be the primary technique for depositing fuel particles into the core of International Thermonuclear Experimental Reactor (ITER) burning plasmas. This injection scheme will require the use of a curved guide tube to route the pellets from the acceleration device, under the divertor, and to the inside wall launch location. In an initial series of pellet tests in support of ITER, single 5.3-mm-diam cylindrical D_2 pellets were shot through a mock-up of the planned ITER curved guide tube (Combs et al., Symposium on Fusion Technology 2004, Venice, to be published in *Fusion Engineering and Design*). Those data showed that the pellet speed had to be limited to ≈300 m/s for reliable delivery of intact pellets. Also, microwave cavity mass detectors located upstream and downstream of the test tube indicated that ≈10% of the pellet mass was lost in the guide tube at 300 m/s. The tube base pressure for that test series was 10^{-4} torr. However, for steady-state pellet fueling on ITER, the guide tube will operate at an elevated pressure due to the pellet erosion in the tube. Assuming operation at 10 Hz with a 10% mass loss during flight in the tube and the available pumping configuration/parameters for ITER pellet injection, calculations suggest an operating pressure in the range of 10 torr. Thus, experiments to ascertain the pellet integrity and mass loss under these conditions have been carried out. No significant detrimental effects have been observed at the higher tube pressure. The new test results will be presented and compared to the baseline data previously reported. An additional test series at 100 torr is planned, and the initial results from that will also be presented.

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