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直線型ダイバータ模擬装置TPD-Sheet IVを用いた Super-X ダイバータに関する模擬実験
Experimental simulations for Super-X divertor using a linear divertor simulator TPD-Sheet IV

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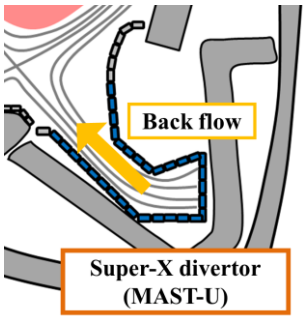
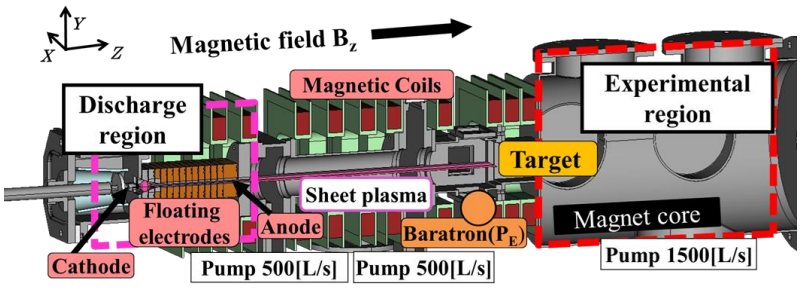
In the magnetic confinement fusion reactor for high power and long pulse operation, enormous heat flux (exceeding 10 MW/m2) is expected to flow onto divertor plates from core plasma. In order to reduce this heat load, the divertor geometry on stationary detached plasma formation must be realized. In addition, the neutral particle flowback into the core plasma is necessary to suppress by the divertor geometry. The Super-X divertor has been proposed by DEMO divertor concept (Fig 1), investigated using simulations. Its optimization needs detail information on confined neutral particles and their physical process. An experimental simulation on the V-shaped, long-leg and baffled long-leg target for closed divertor has been conducted by a liner divertor plasma simulator TPD-Sheet IV [1]. Experimental simulations of divertor geometries for the formation of detached hydrogen sheet plasma using the linear divertor plasma simulator TPD-Sheet IV (Fig, 2). In order to understand the basic mechanism of detached plasma, we have carried out an experiment using Super-X target geometry (Fig, 3). In this experiment, the ionization and recombination rate are discussed by using the collisional-radiative (CR) model. The electron density and temperature were measured using a Langmuir probe. Ionization and recombination ratio (P_{Ion}, P_{Rec}) are discussed from experimental data of T_e and n_e, using the collisional-radiative (CR). In the result that Super-X target effectively enhances plasma detachment in the low pressure.



Fig, 1 Super-X divertor



Fig, 2 Linear divertor plasma simulator TPD-Sheet IV

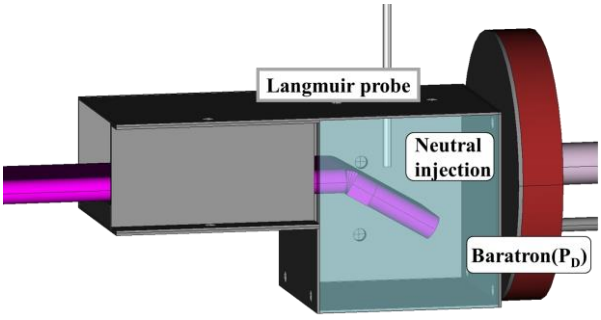


Fig 3 Super-X divertor target

[1] S. Tanaka, et al., Fusion Sci. Tech. 63 (2013) 420