Design study of V-shaped target in divertor simulator TPD-SheetIV

A. Tonegawa, T. Shibata, T. Torada, H. Komukai, N. Mine, T. Ono, K. Kawamura

Department of Physics, School of Science, Tokai University,
1117 Kitakaname, Hiratsuka, Kanagawa, 259-1292, Japan

e-mail: tone@keyaki.cc.u-tokai.ac.jp

In order to achieve the high performance plasma for high power and long pulse operation, the divertor design should be optimized to handle such high heat and particle fluxes. In JT-60SA or ITER, the bottom part of the divertor chamber forms a distinct corner (is V-shaped) with the target was proposed for high gas conductance between the divertor legs. Recently, the closed Helical Divertor (HD) in LHD is planned to accomplish an active neutral particles control to improve plasma confinement and to sustain high performance long pulse discharges. In this study, we present the experimental simulation of the V-shaped target via detached plasma formation of hydrogen plasma in a linear divertor plasma simulator TPD-SheetIV. Three types of target geometry (V-shaped, oblique, and vertical targets) have been investigated. Measurements of the electron density, Ne, and the electron temperature, Te, were carried out in hydrogen detached plasma with hydrogen gas puff. The power on the target, Q, was measured by calorimeter. It is also intended to show that the observed hydrogen Balmer spectra could be explained by EIR. At the V-shaped target, detached condition with high radiation loss is produced easily. Also, Te and Q rapidly decrease with increasing gas pressure. The V-shaped target enhances the recycling and detachment plasma is attained there effectively.