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Experimental investigation of high-speed gas flow generation by a compact toroid injection into a gas neutralizer R. NAKANISHI, D. LIU, T. NAKATSUKA, N. FUKUMOTO, Y. KIKUCHI, M. NAGATA, Univ. of Hyogo, T. TAKAHASHI, Gunma Univ. — We have investigated production of high-speed gas flow by using a compact toroid (CT) injector as a new technique for fuelling future reactors [1]. An accelerated CT plasmoid penetrates into a drift tube as a neutralizer cell, then high-speed neutral particle flow is generated through charge-exchange between CT plasma and neutral gas. In the preliminary experiment, a single-stage CT injector produced CT plasmas with the density of 1$\sim$4 x10^{21} m^{-3} and the speed of 30$\sim$70 km/s. The plasmas penetrated into the neutralizer cell filled with hydrogen gas up to about 10^{-3} Torr by using a piezoelectric valve. However remarkable results were not obtained. We have also calculated neutralization efficiencies of CT plasma using the model of the axial NBI into a FRC plasma, and which is equivalent to that of CT injection into neutral gas. The result indicated that neutralization efficiency could be enhanced to be 40 % by increasing the gas pressure up to 0.1 Torr. Thus, in order to obtain the higher pressure, the piezoelectric valve was replaced with a fast solenoid. As a diagnostic tool of neutral gas flow, a pressure sensor with high time resolution was newly equipped. We will present the experimental demonstration on the new setup. [1] Y. Ito, et al., Bull. Am. Phys. Soc., **52**, No. 11, CP8-62 (2007).

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