

Abstract Submitted
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Development of Compact Toroid Injector for C-2 FRCs TADAFUMI MATSUMOTO, JUNICHI SEKIGUCHI, TOMOHIKO ASAI, Nihon University, HIROSHI GOTA, EUSEBIO GARATE, IAN ALLFREY, TRAVIS VALENTINE, BRETT SMITH, MARK MOREHOUSE, Tri Alpha Energy, Inc., THE TAE TEAM — Collaborative research project with Tri Alpha Energy has been started and we have developed a new compact toroid (CT) injector for the C-2 device [1], mainly for fueling field-reversed configurations (FRCs). The CT is formed by a magnetized coaxial plasma-gun (MCPG), which consists of coaxial cylinder electrodes; a spheromak-like plasma is generated by discharge and pushed out from the gun by Lorentz force. The inner diameter of outer electrode is 83.1 mm and the outer diameter of inner electrode is 54.0 mm. The surface of the inner electrode is coated with tungsten in order to reduce impurities coming out from the electrode. The bias coil is mounted inside of the inner electrode. We have recently conducted test experiments and achieved a supersonic CT translation speed of up to ~ 100 km/s. Other typical plasma parameters are as follows: electron density $\sim 5 \times 10^{21} \text{ m}^{-3}$, electron temperature ~ 40 eV, and the number of particles $\sim 0.5\text{--}1.0 \times 10^{19}$. The CT injector is now planned to be installed on C-2 and the first CT injection experiment will be conducted in the near future. The detailed MCPG design as well as the test experimental results will be presented.

[1] M.W. Binderbauer *et al.*, Phys. Rev. Lett. **105**, 045003 (2010).

Hiroshi Gota
Tri Alpha Energy, Inc.

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