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TS-6合体実験におけるオブレートな磁場反転配位の生成と安定性

Oblate FRC Formation and Instability in the TS-6 Merging Experiment

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An oblate FRCs has elongation E < 1. This unique geometry may give it a special property of being globally stable at large s (averaged number of gyro-radii), as suggested by hybrid simulations that included close-fitting shells, and NBI effects [1]. Past studies in TS-4 tested this assumption but stabilization was limited potentially due to low NBI efficiency caused by inserted magnetic probe arrays [2]. Other studies suggest that inductive sustainment [3] and intermittent spheormak merging [4] can also help stabilize and sustain an oblate FRC.

The aim of this work is to establish an experiment to test stabilization of global MHD modes of an oblate FRC in the TS-6 merging device using NBI (with non-invasive magnetic diagnostics), inductive sustainment, and intermittent merging of spheromaks. Here we report the experimental design and setup progress.

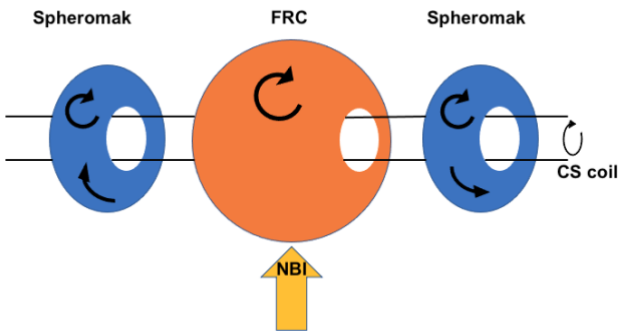

Fig. 1: Oblate FRC stabilization experiment concept.

TS-6 is a ST/CT device with aspect ratio ~1.5, capable of formation and merging of two torus plasmas. The first step is to establish FRC plasma formation. Z-theta pinch formation method is used to form an oblate FRC through merging. Six pairs of electrodes are used for each spheromak. The electrodes are undergoing vacuum and electric insulation test. After FRC formation, two flux-cores form spheormaks with opposite helicity at both ends and merge with the FRC to sustain and stabilize it. The flux-cores are also undergoing vacuum test. A washer gun type NBI similar to the one used in TS-4 is being developed in the lab, and it is undergoing vacuum test as well. CS coil has completed high voltage test and is ready for use. Concept of the experiment is shown in Figure 1.

This presentation will describe the experimental setup in detail and discuss issues encountered during the setup.

Reference

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[3] S. P. Gerhardt, *et al.*, Phys. Rev. Lett. **99**, 245003 (2007)
[4] Y. Ono, *et al.*, Nucl. Fusion **43** 649 (2003)