

Abstract Submitted  
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**Spectroscopic Measurement of Ion Flow During Merging Start-up of Field-Reversed Configuration**<sup>1</sup> HIROTAKA OKA, MICHIAKI INOMOTO, HIROSHI TANABE, MASANOBU ANNOURA, YASUSHI ONO, KOSHICHI NEMOTO, The University of Tokyo — The counter-helicity merging method [1] of field-reversed configuration (FRC) formation involves generation of bidirectional toroidal flow, known as a “sling-shot.” In two fluids regime, reconnection process is strongly affected by the Hall effect [2]. In this study, we have investigated the behavior of toroidal bidirectional flow generated by the counter-helicity merging in two-fluids regime. We use 2D Ion Doppler Spectroscopy to measure toroidal ion flow during merging start-up of FRC from Ar gas. We defined two cases: one case with a radially pushed-in X line (case I) and the other case with a radially pushed-out X line(case O). The flow during the plasma merging shows radial asymmetry, as expected from the magnetic measurement, but finally relaxes to a unidirectional flow in plasma current direction in both cases. We observed larger toroidal flow in the plasma current direction in case I after FRC is formed, though the FRC in case O has larger magnetic flux. These results suggest that more ions are lost during merging start-up in case I. This selective ion loss might account for stability and confinement of FRCs probably maintained by high energy ions.

[1] Y. Ono, et al., Nucl. Fusion 39, pp. 2001-2008 (1999).

[2] M. Inomoto, et al., Phys. Rev. Lett., 97, 135002, (2006)

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