

Abstract Submitted
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Reconnection and Ion Acceleration Processes during Counter Helicity Merging of Spheromaks in the MRX M. INOMOTO, Osaka University, S.P. GERHARDT, M. YAMADA, H. JI, B. MCGEEHAN, A. KURITSYN, Y. REN, E. BELOVA, PPPL — A series of experiment studying FRC formation has recently been carried out in the Magnetic Reconnection Experiment (MRX) using counter-helicity merging of two spheromaks [1,2]. In MRX, there are two different counter-helicity cases: the two initial spheromaks have toroidal field polarities of 'positive-negative' and 'negative-positive' (toroidal field sign chosen with reference to the toroidal plasma current, which is in the same direction for both spheromaks). These two configurations show different features in magnetic probes, Langmuir probes and spectroscopic measurements. In one case, we observe X-point structure which is radially pushed in from the axis position of the spheromaks with significant radially outward ion flow, while in the other case, X-point structure was radially pushed out with almost no radially outward ion flow. Two-fluids effect is thought to play a significant role in determining dynamics of reconnection process in scales of or below ion skin depth. Detailed measurements using a newly fabricated high-resolution magnetic probe will be presented together with spectroscopic measurements and physics explanations. This work is supported by the US Department of Energy, the NSF, NASA and Japan Society for the Promotion of Science. [1] M. Yamada, et al., Phys. Fluids B 3, 2379-2386 (1991). [2] Y. Ono, et al., Phys. Plasmas 4, 1953-1963 (1997).

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