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Three-Dimensional Magnetic Field Line Analysis of Two Merging Spheromaks with Counterhelicity KEII GI, TORU II, TOSHIYUKI UMEZAWA, MICHIAKI INOMOTO, YASUSHI ONO, University of Tokyo — The TS-3 and TS-4 experiments at the University of Tokyo have demonstrated the counterhelicity merging of two spheromaks to form an oblate Field-Reversed Configuration (FRC). Significant ion heating of magnetic reconnection was experimentally observed and explained by the slingshot effect [1], but its detailed mechanism is left unsolved. We analyzed for the first time three-dimensional structures of magnetic field lines to trace the shape of them. After the two-dimensional magnetic probe array measures the magnetic field vector, its numerical integration for tracing the magnetic field lines is made by the Dormand-Prince method in a cylindrical coordinate system. The sharp bending of the magnetic field lines is identified near the X point, suggesting that the Hall effect in process of magnetic reconnection affects the slingshot. The shape of the reconnecting magnetic field lines is affected by the current sheet dissipation. We will present two cases of counterhelicity merging [2] with the Hall effect.

[1] Y. Ono et al., Phys. Rev. Lett. 76, 3328 (1996).
[2] M. Inomoto et al., Phys. Rev. Lett. 97, 135002 (2006).

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