# 磁気リコネクション境界層でのイオンの温度異方性による運動論的効果

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# Kinetic effects due to ion temperature anisotropy along the magnetic reconnection layer

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Temperature anisotropy often plays an important role on the plasma dynamics in collisionless plasma. In the case of magnetic reconnection, the ion temperature anisotropy is produced by the PSBL (plasma sheet boundary layer) ion beams accelerated in and around the diffusion region, and the anisotropic plasma with $T_{i,para} > T_{i,perp}$ develops along the reconnection layer [e.g. *Lin and Swift*, 1996; *Lottermoser, et al.*, 1998], where $T_{i,para}$ and $T_{i,perp}$ are respectively the ion temperature parallel and perpendicular to the magnetic field. Not only simulations but also observations have shown the signature of the ion temperature anisotropy during reconnection in the earth's magnetotail [*Cowley, et al.*, 1984; *Hoshino, et al*., 2000]. Due to this inherent behavior of temperature anisotropy in the collisionless reconnection, the reconnection dynamics such as the time evolution of the plasma heating and acceleration is coupled with the formation and relaxation of the temperature anisotropy.

In order to investigate the nonlinear coupling of the reconnection dynamics and the temperature anisotropy, we perform a two-dimensional electromagnetic hybrid code of magnetic reconnection. Specifically, we study the relaxation process of the temperature anisotropy by focusing on the firehose instability. The firehose instability is suggested to take place at the downstream region of discontinuities formed along the reconnection layer [e.g., *Karimabadi*, 1999]. While, in the transition region of the discontinuities, the ion temperature anisotropy is not so large as to satisfy the firehose unstable condition [e.g., *Liu, et al*. 2011; *Higashimori and Hoshino*, 2011]. In this presentation, we will analyze ion velocity distribution functions in detail, and will argue about the relationship between the condition of the firehose instability and the plasma parameters such the beam density and the relative bulk velocity of two ion components in the transition region.