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Internal structure of plasmoids in collisionless magnetic reconnection LI-JEN CHEN, YI-MIN HUANG, AMITAVA BHATTACHARJEE, BRIAN SULLIVAN, University of New Hampshire, WILLIAM DAUGHTON, LANL, NAOKI BESSHO, University of New Hampshire — Strong unipolar core magnetic fields and density compression are observed in the plasmoids which produce suprathermal electrons during magnetotail reconnection with a weak guide field ($< 3\% B_0$, where B_0 is the reconnecting field strength)[1]. The in-plane electric fields in these plasmoids are localized near the plasmoid core and point toward the core. Hall MHD and PIC simulations show that these features are consistent with plasmoids generated in the reconnection electron current sheet. In particular, the strong density compression and unipolar core field can be generated under sufficiently low upstream beta (≤ 0.4) with a weak ambient guide field. The beta-dependence of the core-field generation allows us to infer the upstream condition of the observed magnetotail reconnection based on the observed plasmoid internal structures.

[1] Phys. Plasmas, 16, 056501 (2009)

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