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Supporting Information for

Ion-scale secondary flux-ropes generated by magnetopause reconnection as resolved by MMS

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Supplementary information: computer simulation

The simulation was performed using the P3D code [Zeiler et al. 2002]. The simulation data are presented in a coordinate system that is directly comparable to GSE. The simulation is 2.5 dimensional ($\partial/\partial y$) = 0, and the (x,z) domain is 20.48 x 40.96 (grid scale 0.01) in distance units normalized to the magnetosheath ion inertial length. The ion to electron mass ratio is 100, and $c/V_{A,m'sheath} = 15$ where $V_{A,m'sheath}$ is the magnetosheath Alfvén speed. The time step for the particles is 0.001 times the inverse of the ion cyclotron frequency in the magnetosheath.

Initially the simulation is set up with a double hyperbolic tangent profile variation in the *x* direction of the *z* component of the magnetic field and the temperature. This corresponds to

two current sheets extending along the *z* direction at different values of *x*, contained within the domain.

The magnetic field profile across each of these current sheets is matched to a magnetospheric reconnecting magnetic field B_z = 39 nT and a reconnecting magnetosheath magnetic field B_z = 23 nT. The temperature and density profiles are set to ensure the plasma is initially in pressure balance and at rest, consistent with the magnetosheath properties (here chosen such that n = 11.3 cm^{-3} and T = 232.5 eV). Since the simulation time and length scales are normalized to the magnetosheath values, the simulation unit of length = 67.8 km, and the simulation unit of time = 2.22 s. The code and parameters are the same as those used in Burch et al. [2016].

Figure 4 in the main manuscript shows a small portion of the simulation domain at t = 16. Note that the coordinate system has been shifted, so that the current sheet lies along x = 0. Similar structure and dynamics are observed at the other current sheet (not shown).

Burch, J. L., et al. (2016), Electron-scale measurements of magnetic reconnection in space, Science, doi: 10.1126/science.aaf2939.

Zeiler, A., D. Biskamp, J. F. Drake, B. N. Rogers, and M. A. Shay (2002), Three-dimensional particle simulations of collisionless magnetic reconnection, J.Geophys.Res., 107(A9), 1230, doi:10.1029/2001JA000287.