

Interactive comment on “A source mechanism for magnetotail current sheet flapping” by Liisa Juusola et al.

Anonymous Referee #2

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Using the 2-D global hybrid-Vlasov model Vlasiator, authors studied the response of magnetotail at the tail center to the magnetopause perturbation, created by subsolar magnetopause reconnection. Authors declared that the appeared oscillation of tail Bx component should be the kink-like flapping motion propagating towards both tail flanks. Nonetheless, the simulation is 2-D, The variation of this oscillation in Y direction can't be investigated, it is still hard to convince readers that the oscillation of Bx component is indeed associated with the kink-like flapping propagating azimuthally. I will explain my reasons in the following.

Major comment As stated in the introduction, Rong et al.(2015) found that the different flapping modes can yield a same flapping sequence of Bx component. How can you differentiate these flapping modes in your simulation? In my view, only the 3-D

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simulation can unambiguously answer it.

Specific comments 1. Line 16 of page 2, the paper of Shen et al.[2008,AG] and Forsyth et al.,(2009,AG) should be cited when referring the disturbance of solar wind flow as the flapping source. Shen, C., Z. J. Rong, X. Li, M. Dunlop, Z. X. Liu, H. V. Malova, E. Lucek, and C. Carr (2008), Magnetic configurations of tail tilted current sheet, Ann. Geophys., 26, 3525–3543. Forsyth, C., M. Lester, R. C. Fear, E. Lucek, I. Dandouras, A. N. Fazakerley, H. Singer, and T. K. Yeoman (2009), Solar wind and substorm excitation of the wavy current sheet, Ann. Geophys., 27, 2457–2474.

2. The joint observation of flapping event by TC-1 and Cluster (Zhang et al., 2005,AG) showed that the kink-like flapping waves propagate longitudinally with the same flapping phase at different X coordinates. However, it can not be characterized in your 2-D simulation, e.g. Fig1. Zhang, T. L., et al. (2005), Double Star/Cluster observation of neutral sheet oscillations on 5 August 2004, Ann. Geophys., 23, 2909–2914.

3. Fig.3 predicts a dispersive flapping waves with time-increased frequency. To my knowledge, there is no observation evidence to back up it. Careful comparisons are needed.

4. Even your 2-D simulation is valid to explain the triggering of kink-like flapping, the magnetopause disturbance is not the unique source. What I mean is that, the sources result in the pressure imbalance over tail current sheet could be multiple.

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