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

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>1. As you replied that your 2-D simulation cannot definitely differentiate which flapping type it is, it is only a potential candidate to explain the source to trigger the kink-like flapping, thus I think the title of your paper could be better changed as "A possible source mechanism for magnetotail flapping motion...”.

Please note that the title does not only refer to the kink-like flapping in the y direction but also flapping in the x-z plane. While the significance of our results as a source mechanism to the waves in y direction remains a point of discussion, we have shown that in the simulation the mechanism does indeed produce flapping in the x-z plane.

Nonetheless, we can change the title to "A possible source mechanism for magnetotail

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Discussion paper

current sheet flapping".

>2. Although you calculated the dBx/dt, Vz, the location of plasma sheet, and shown it in Figure 6, I did not see any comparisons between your simulation and the actual observation properties of flapping motion. I understand your simulation is 2-D, you are unable to compare the wavelength, propagation speed, etc., but you can compare the flapping period at least. From your Figure 3, Figure 6, your flapping period is about 2 hours, it is evidently much larger than the typical observed flapping period (10 mins). The simulation is a good tool to explore the physical mechanism, but I CANNOT accept it without any comparison with observations.

Please note that the time in the figures in not given in HH:MM (hours and minutes) but MM:SS (minutes and seconds). This information is provided both in the caption of Figure 1 and on page 3, line 24 where this figure is first introduced. The captions of the following figures provide the information that they follow a format similar to that of Figure 1. However, as the notation was not clear, we are happy to include the explanation ", where MM indicates minutes and SS seconds" both on page 3, line 24 and in the caption of Figure 1.

We review many observational properties of current sheet flapping, including numerical values, in the Introduction. In section 3.1 we compare these numbers (including Bx and Vz) with those from our simulation, and find good agreement. The flapping period is compared with the observations of Sergeev et al. (1998) on page 3, lines 30-31.

>3. As you agree with my comment that, the source could be multiple. Here, you only consider the case of solar wind that "Steady solar wind, characterized by Maxwellian distribution functions, proton density of 1 cm-3, temperature of 0.5 MK, velocity of -750 km/s along the x axis, and magnetic field of -5 nT along the z axis (purely southward IMF)". Have you considered the other solar wind conditions, e.g. the northward IMF; the SW with a jump of dynamic pressure? I think you have to answer a question if your study is really important: Among the possible multiple sources, how

much the case you studied contribute to the tail flapping motion?

A particular set of solar wind conditions instead of a range of values was used because of the heavy computational load of running this type of a simulation. This same run has been analyzed in several previous studies as well (page 2, lines 23-25). The run was suitable for our study, because current sheet flapping occurred in it.

The question posed by the Referee is certainly interesting and a good topic for a future study. However, we consider it to be outside of the scope of the present paper.

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