

Interactive comment on ““Earth-like” planetary magnetotails as non-linear oscillators” by Robert J. Burston

Anonymous Referee #1

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Comment on <“Earth-like” planetary magnetotails as non-linear oscillators > by Robert J. Burston

This paper presents a non-linear oscillator model of a simple system analogous to “Earth-like” magnetotail plasmoid formation and release dynamics. I read this paper initially with great interest, but feel very disappointed in the end. Authors argued that the dynamics of “Earth-like” magnetotail can be studied by analogy with the movement of mechanical spring, but the model parameters for the run are set artificially (see table 1- table 6), which have nothing to do with the planetary magnetosphere. So, I cannot see any application to the planetary magnetotail, and cannot recommend publication. Below are my comments. Major comments: 1. The “Introduction” is too long. For example, the section 1.3.2, 1.3.3 texted here are nearly irrelevant to planetary magne-

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totail. Much of the content is about the fundamentals of dynamic system, like Chaos, limit cycles. I suggest deleting these irrelevant texts, and highlighting your reasons and motivations of this study. 2. The analogy is a good way to insight the dynamic physics of magnetotail. However, before performing the analogy, we have to show the physical reasons why the dynamics of planetary magnetotail can be studied by analogy with the spring. Currently, we actually know few about the true physics of planetary magnetotail, although many magnetotail substorm models have been presented. To what extent the analogy can well account for the magnetotail dynamics? The simple or casual analogy makes no sense to understand the magnetotail dynamics? 3. In this paper, author just performed the run for the dynamic behavior of a spring using artificial parameters, and argued the application to planetary magnetotail. Actually, I didn't see any parameters of planetary magnetotail are adopted to run the model. Therefore, this paper may fit the journals of nonlinear process better. 4. The author proposed that this model includes the Dungey and Vasliunas Cycle, and can separate the contribution from these two drivers in the Abstract (“It includes, for the first time in such a model, separate drivers for the Dungey and Vasyliunas Cycles. . .”). However, from Section 3.2, the results displayed here are only sensitive to the total contribution ($CD+Cv$), the author didn't show how can we separate these two drivers. Another question is that if we just change the value of $CD+Cv$, whether the magnetotail behavior shows similarly to the Logistic map orbit diagram (such as three periodic windows)? Is there any observational evidence? 5. Line 45: Note that Earth's magnetotail can also undergo Dungey cycle, and substorm can occur under northward IMF.

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