大規模シミュレーションによる木星磁気圏の構造・ダイナミックスの研究

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Research of Jovian magnetospheric dynamics and configuration from global simulation

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Jupiter has the huge intrinsic magnetic field and rapid rotation. In addition, Jupiter locates far from the Sun as compared to the Earth. Thus it is thought that the effect of solar wind to the Jovian magnetosphere is much weak in early days. In the Galileo era, a lot of magnetospheric phenomena were observed and then theoretical analyses have been done. Then the understanding of Jovian magnetosphere made progress and the effects of solar wind to Jovian magnetosphere were appeared more and more. However, there are some outstanding problems which include the difficulty to distinguish whether the dynamics come from Jovian internal process or interaction of the solar wind. For example, *Joy et al.* [2002] indicated the bimodal distribution of the magnetopause and bow shock location using all observation results of Jupiter in those days and they cannot divide these distributions are come from whether internal or external effects. In the MHD simulation of Jovian magnetosphere, we have obtained the characteristic variation of bow shock and magnetopause locations to the solar wind dynamic pressure which may relate with the bimodal distribution.

In other case, *Woch et al.* [2002] reported that in the Jovian magnetotail the periodic plasma burst was occurred with 2, 3 days interval. Some (*Kronberg et al.*, 2005, etc) said that these periodic phenomena were caused by the only internal processes, no external effects. On the other hands, we suggested that the periodic phenomena were controlled by the configuration of Jovian magnetosphere which was dominated by the Jovian internal characters and the solar wind. Recently similar phenomena are observed by the New Horizon spacecraft. The high energy structures were observed in distant magnetotail repeatedly. *MacComas et al.* [2007] suggested that these were plasmoid which had been observed by Galileo. From the MHD simulation we have obtained the similar configuration of periodic plasmoid observed by the New Horizon and the IMF affected to the periodicity of plasmoid ejection.

Finally we will show the latest our simulation results using the massively parallel super computer. Now we perform the simulation with 0.15 R_J gird spacing and will connect the hybrid simulation around nearby Jupiter.