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磁気圏への太陽風流入におけるケルビン・ヘルムホルツ渦起因の磁気リコネクションが果たす役割
Roles of magnetic reconenction induced by the Kelvin-Helmholtz vortex in the solar wind entry into the magnetosphere

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We have performed two and half dimensional full particle simulations of the MHD-scale Kelvin-Helmholtz vortex (KHV). The KHV has been believed to cause direct entry of the solar wind plasma into the magnetosphere across the low-latitude magnetopause under northward IMF conditions. Indeed, KHVs have been frequently observed around the low-latitude magnetopause when the IMF is northward. In order to understand the precise solar wind entry mechanism related with the KHV, a number of numerical simulations have been performed. Nevertheless, there is still no comprehensive understanding of the actual entry mechanism. Since the size of the observed KHVs is of MHD-scale, it may be expected that the behavior of the KHV can be described by the ideal-MHD equations. In the ideal-MHD, however, the frozen-in condition does not allow plasmas to be transported across the magnetic boundary. This indicates that non-ideal MHD effects should be considered to truly understand the actual entry mechanism. Fortunately, recent developments of computer resources allow non-ideal MHD simulations of the MHD-scale KHV to be performed. Such simulations have revealed that magnetic reconnection induced by the KHV can cause the effective solar-wind entry along reconnected field lines. Furthermore, our particle simulations are quantitatively confirming the actual entry rate of the solar-wind plasma via the vortex-induced reconnection. In this presentation, we will present the particle simulation results and discuss how important the KHV is in the solar wind entry into the magnetosphere.

キーワード: ケルビン・ヘルムホルツ, 太陽風流入, 磁気リコネクション, 粒子シミュレーション, プラズマ混合, 磁気島
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