

Magnetospheric physics as the science of compound system

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The confinement of earth's magnetospheric field by the dynamic pressure of the solar wind is the primary cause of magnetospheric formation. However, additional generation of convection is indispensable for a real magnetosphere accompanying disturbance phenomena. In this paper, convection is constructed as a compound system based on the magnetosphere-ionosphere (M-I) coupling scheme and the indispensable unification with plasma population regimes. In these considerations, primary elements that must be set to a self-consistent configuration are convection flows in the magnetosphere and the ionosphere, field aligned current (FAC) systems, ionospheric currents, energy conversion processes, and plasma pressure. Then, global current systems are coupled with plasma population through the formation of dynamo. The magnetospheric model derived from this consideration is the force-free lobe field and open cusp as the generator of region 1 FAC. In this model, tangential Maxwell stress on the magnetopause acts to increase plasma internal energy around the cusp. The plasma internal energy accumulated in the cusp further drives the region 1 FAC.