

Pi2 pulsations in the MHD global simulation

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The global MHD simulation recently improved for reproduction of the substorm process [Tanaka et al, 2008] is employed for assessment of the generation mechanisms regarding to the Pi2 pulsations so far presented. As long as we concern that ideal MHD simulation, probably, the Kelvin-Helmholtz instability which is invoked by the bifurcated flows induced from the flow burst in the near-Earth midnight magnetosphere region at the substorm onset is one candidate for generation of the Pi2 pulsations. This instability launches the compressional wave which is trapped in the plasmasphere to be the plasmaspheric resonance mode for the mid- and low-latitude Pi2 pulsations. Another candidate is the wedge-like current transformed from the cross-tail current in the near-Earth lobe region. Since this wedge-like current system develops quite rapidly, it is supposed that the Alfvén wave associated with the FAC of the wedge-like current is bouncing between the ionospheres of both hemispheres. Note that this wedge-like current system is not generated by disruption of the cross-tail current through some plasma kinetic process. The simulation indicates, on the other hand, that a transient plasma vortex invoked by the bifurcated flow burst concentrated in the equatorial plane swallows a part of the cross-tail current in the off-equatorial plane. It is also noted that the amount of FAC associated with the wedge-like current is quite small compared with the normal Region 1 current at the substorm onset. In the last, as the present discussion is quite rough one, we need to investigate possibility of the mechanisms with rigorous discussion from now.