

## Transmission of magnetospheric electromagnetic energy to the equatorial ionosphere

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The preliminary impulse of geomagnetic sudden commencements and quasi-periodic DP2 fluctuations are observed simultaneously at high latitudes and the dayside geomagnetic equator. The high latitude magnetic perturbations are caused by ionospheric Hall currents, while the equatorial perturbations are due to ionospheric Pedersen currents amplified by the Cowling effects. The electric field responsible for the equatorial currents is transmitted instantaneously from the polar ionosphere by the TM0 mode waves in the Earth-ionosphere waveguide (Kikuchi and Araki, 1979). In this paper, we attempt to explain the electromagnetic energy consumed in the equatorial ionosphere by means of the TM0 mode waves. For this purpose, we examine electromagnetic energy transmitted in a lossy transmission line composed of a finitely conducting ionosphere and the perfectly conducting ground. A source electric potential is given at one end and null potential at the other end of the transmission line, corresponding respectively to the foot of a field-aligned current on the dawn- or dusk-side in the polar ionosphere and to the noon-midnight meridian at the equator where the positive and negative electric potentials impressed by the FACs meet and cancel each other. It is shown that the ionospheric currents carried by the TM0 mode waves grow gradually in the course of reflections at the two boundaries, and reach a steady state value which explains the energy consumption in the equatorial ionosphere.