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Guided waves in the plasma sheet and triggering of a substorm

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Abstract. A guided propagation of magnetoacoustic wave in the plasma sheet located between two lobes of the magnetotail is investigated. The dispersion equation for the wave and equation connecting a disturbance of plasma pressure inside the plasma sheet and amplitude of the plasma sheet boundary oscillations are obtained. For some value of plasma pressure disturbance, the displacement of the plasma sheet boundaries becomes of order of the half-thickness of the plasma sheet. In the case of symmetrical oscillations of the boundaries ("sausage-like" mode), it creates the favorable conditions for reconnection of the magnetic field lines in the magnetotail and may lead to triggering of a substorm. The magnetoacoustic wave may be generated by sudden impulse of the solar wind plasma pressure.