



Coupling between magnetospheric and ionospheric scales in discrete auroral arcs formation

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In a steady-state situation the closure condition for the auroral electric circuit can be expressed as the solution of the current continuity at the topside ionosphere. In this paper we report results obtained with a quasi-static model of the formation of discrete arcs, based on the existence of a magnetospheric generator described by a tangential discontinuity (TD) at the interface between plasmas with different macroscopic properties (bulk velocity, density or electron temperature). The generator is linked by magnetic field lines to the auroral ionospheric load. We investigate the effects on the arcs characteristics of the ionospheric feedback, modeled as the variation of the Pedersen conductivity with the energy flux of incident magnetospheric electrons. The results illustrate the coupling between magnetospheric scales, typical for the generator, and the auroral arcs scales obtained at the ionospheric altitudes. We describe the variation of the arcs' thickness and luminosity with the properties of the magnetospheric TD generator, in particular with the shear of the magnetospheric bulk velocity, the gradient of the magnetospheric density and the magnetospheric electron temperature.