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Penetration of electric field from the near-ground source to the ionosphere. Problem of dynamic-quasistatic limiting pass

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The problem with penetration of the ULF electric field, exited by the current source in the atmosphere, into the upper ionosphere is investigated both within the dynamic and the quasi-electrostatic approach. It had been shown that (1) both approaches yield practically similar results for the penetration of the electric field in the case of closed geomagnetic field lines; (2) in the case of opened geomagnetic field lines, only dynamic model for the penetration of field from the atmosphere to the upper ionosphere is adequate.
There is a problem of limiting pass from dynamic to quasi-stationary determination of the electric field penetrating to the (upper) ionosphere and magnetosphere when the frequency of the current source located in the lower atmosphere decreases. At the corresponding limiting pass, the quasi-magnetostatic component should also be present, which wasn't taken into account earlier. We proposed the model of penetration of ULF electric field through the atmosphere-ionosphere system with given sources with including the problem of limiting pass from dynamic to quasistatic modelling.

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