Numerical simulation of magnetic field dynamics in solar corona with a scheme that is conservative relative to the magnetic flux

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Magnetic field behavior in an active region determines the powerful phenomena that are responsible for disturbances in the Earth magnetosphere. Numerous MHD numerical experiments show that such investigations demand a very stable finite-difference scheme. But, even using of the absolutely implicit code does not allow carrying out long term MHD calculations near the photospheric boundary where magnetic field gradient is too strong. The instability development initiated on the photosphere does not permit to make calculation during the several tens of Alfvenic times. This numerical instability appears because rotB does not tend to zero during current relaxation in the magnetic field. The magnetic force appears in a numerical solution, which must not exist in the precise solution. As a result the force initiates a plasma motion and instability development. For supporting rotB = 0 it is necessary to employ the code that is conservative relative to the magnetic flux. Such code has been developed. It permits to simulate current sheet creation and its long time evolution including investigation of its fine structure. In the course of Bastille flare simulation this code has permitted to demonstrate creation of two little branches under the sheet (so called mustaches - slow shocks predicted by Petschek). The similar mustaches above the current sheet have been demonstrated earlier. 3D structure of current sheet magnetic field is investigated.