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Problem of "current disruption" in the near-earth portion of the plasma sheet: nonlinear loss of equilibrium?

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In a number of recent papers the problem of ballooning modes has been studied, which can according to the linear theory, be excited in the near-Earth portion of the plasma sheet, in the geomagnetic tail. With the use of powerful MHD codes, it is also explored what is the character of their later nonlinear evolution: is there the “substorm detonation” or not? We draw attention to an additional factor which is capable to change the results of such an analysis, if applied to disturbances having small scales in the direction across the magnetic field (as it is done in the existing theory): in that case the influence of fast restructuring of the global configuration should be taken into account, i.e. its “dipolarization”. However, for a large-scale disturbance, thus arising effect of phase mixing which suppresses the small-scale disturbance nonlinear growth, is not relevant. And for that disturbance, a proper scheme of description is the nonlinear loss of equilibrium – a fast dynamical bifurcation, occurring with a delay relative to the moment of (slow) passage through the marginally stable state.