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Proton temperature anisotropy and current sheet stability: 2-D hybrid simulations

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In situ measurements show that the solar wind plasma is far from thermodynamical equilibrium and nonthermal distribution functions characterized by a temperature anisotropy, with respect to the direction of the local magnetic field, are constantly observed. Such an anisotropy can be the source of free energy for kinetic instabilities that play a role in the isotropization of the plasma and constrain the local thermodynamics. Moreover, they give rise to electromagnetic fluctuations that can importantly affect the dynamical evolution of the system. We report a study of the development of anisotropy driven instabilities in an inhomogeneous plasma in the presence of current sheets by means of 2-D hybrid simulations. The role of anisotropic protons and related kinetic instabilities on the current sheets stability and reconnection processes are discussed.