Numerical investigation of the current sheet structure in plasma turbulence

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The features of current sheets generated in MHD turbulence play a key role in the possible onset of electromagnetic processes, like, for example, reconnecting instabilities. There is wide observational and numerical evidence that, at least in solar wind turbulence close to the terrestrial magnetosphere, where the species beta parameters attain values close to unity, the characteristic thickness of current sheets generated by Alfvénic turbulence be of the order of the ion skin depth, or, equivalently, of the ion sound Larmor radius. At the same time, some numerical results (see, e.g., [1] and references therein) and theoretical arguments suggest that this result depend on the beta parameter, the current sheet thickness being likely comparable to the ion skin depth at small beta, or to the ion/ion-sound Larmor radius for large values of the ion/electron beta, respectively [2]. We present and discuss some numerical results obtained with the full PIC code SMILEI [3], in which the structure and size of current sheets generated bu turbulence have been investigated at the varying of the beta parameters.

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