



Catalog of velocity distributions around a reconnection site in 2D PIC simulations

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The velocity distribution of electrons and ions are known to be a marker for regions where magnetic reconnection develops. Past theoretical and computational works demonstrated that non-gyrotropic and anisotropic distributions depending on particle meandering motions and accelerations are seen around the reconnection point. The Magnetospheric Multiscale (MMS) mission is expected to resolve such kinetic scale reconnection regions. We present a catalog of velocity distribution functions that can give hints on the location within the current sheet relative to the reconnection point, which is sometimes unclear from pure spacecraft observations. We use 2D PIC simulations of anti-parallel magnetic reconnection to obtain velocity distributions at different locations, like in the center of the reconnection site, the ion and electron diffusion regions, or the reconnection inflow and outflow regions. With sufficiently large number of particles we resolve the distribution functions also in rather small regions. Such catalog may be compared with future MMS observations of the Earth's magnetotail.