Abstract Submitted
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Magnetic Reconnection Scaling from Kinetic Simulations[1]
JEREMIAH BRACKBILL, Retired — A kinetic simulation study of reconnection in two dimensions examines scaling from ion inertial to large scales. The initial conditions model a perturbed, Harris current sheet in a slab geometry with the same plasma conditions as the Geospace Environment Modeling challenge except with an ion to electron mass ratio equal to 180, and with one to many X-points in a periodic array. The spacing of the X-points is constant, so that a case with 16 X-points is 16 times as large as with 1 X-point both along and perpendicular to the current sheet. (The largest domain is 200 by 200 ion skin depths.) The reconnection rate and the amount of reconnected flux scales as the length of the current sheet. At saturation, there may be many current filaments, which begin immediately to coalesce and continue to do so until there results a single current filament. The entire process requires a time of the order of an Alfven transit time, and proceeds in basically the same fashion with very small initial perturbations, equal mass ions and electrons, or a zero background density. The simulations were performed with the implicit-moment, particle-in-cell code CELESTE on a workstation.

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