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Continuum kinetic simulations of the Weibel instability in plasma sheaths[1] KOLTER BRADSHAW, BHUVANA SRINIVASAN, Virginia Tech — When a temperature anisotropy develops across a plasma sheath, growth of the Weibel instability can cause a large magnetic field to develop exponentially from no initial field. Here, simulations of plasma sheaths are performed by directly evolving the ion and electron particle distribution functions with a continuum kinetic code. A steady-state sheath needs to exist for long enough time scales to allow sufficient nonlinear development of the Weibel instability and any associated particle trapping. Creating a particle balance towards a steady-state sheath profile is more straightforward in a particle-in-cell code than a continuum kinetic code. Here, studies of particle balance techniques in a continuum kinetic code will be presented. Furthermore, the effects of a collisional presheath on the Weibel instability will be studied. Using these simulations, the Weibel instability is examined in plasmas sheaths spanning different regimes relevant to nuclear fusion and spacecraft propulsion applications.

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