Abstract Submitted
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Saturation and Long-Time Behavior of Weibel Instability and Electron Beam Transport in Dense Plasmas[1] OLEG POLOMAROV, GE WANGE, GENNADY SHVETS, IFS, University of Texas at Austin, ADAM SEFKOW, IGOR KAGANOVICH, PPPL, Princeton University — The propagation of electron beams in ambient plasma is considered analytically and numerically. For analytical treatment the two-fluid hydrodynamics for beam and plasma electrons is used. Two numerical approaches are used: the reduced description [PoP, 14, 043103 (2007)] (in which the beam is modeled by particles and the plasma is an electron fluid) and the LSP PIC simulations. The detailed analysis of linear/non-linear stages and the saturation of the Weibel filamentation instability is presented and the instability long-term non-linear behavior is emphasized. For example, it is discovered that the filament formation and merger can lead to the growth as well as the decrease of the magnetic energy for sub/super-alfvenik filaments. The plausible final state to which the Weibel instability evolves for large times is presented. Also, the peculiarities of 1D, 2D and 3D spatial behavior of the Weibel and electrostatic two-stream instabilities of the relativistic electron beam propagating in constant density as well as in the steep gradient background plasmas (the Fast Ignition case) are considered.

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