Abstract Submitted
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Weibel instability in positron-electron plasma BARBARA SHRAUNER, Washngton University — The Weibel or filamentation instability of counter-flowing beams described by a recent model is investigated. The model combined computer simulations and an analytic one-particle distribution function for the quasi-equilibrium of a positron-electron plasma. An electron-ion plasma is not considered. This instability is conjectured to give rise to turbulent magnetic fields in collisionless shocks. The linear growth rate and time dependence of the instability is determined from the Vlasov-Maxwell equations and confirms that the dominant mode for the magnetic field has the spatial dependence of the initial perturbed magnetic field as found by the simulations. The quasi-equilibrium distribution function is expanded in Hermite polynomials varying in two spatial variables, a generalization of earlier results for nonlinear transverse waves. The quasi-equilibrium in reference 1 is further constrained by the conservation of particle number and total energy. That quasi-equilibrium agrees only qualitatively with the simulation results. A nonlinear model is proposed with the sinh-Poisson equation. An analytic form for the vector potential is found for this nonlinear model in terms of Jacobian elliptic functions. A. Suzuki and T. Shigeyama, Astrophys. J. **695**, 1550-1558 (2009). B. Abraham-Shrauner, Phys. Fluids, **11**, 1162-1167 (1968).

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