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Energy transfer via Weibel and two-stream instabilities in two-temperature electron-ion plasmas JAEHONG PARK, CHUANG REN, ERIC G. BLACKMAN, XIANGLONG KONG, University of Rochester — Whether an efficient collisionless temperature equilibration mechanism exists for a two-temperature ion-electron plasma, with $T_i > T_e$, is important for understanding astrophysical phenomena such as radiatively inefficient accretion flows and relativistic collisionless shocks in GRBs. Here we study whether the two-stream and Weibel instabilities driven by proton counter-streaming and/or temperature anisotropy can be such a mechanism. Analysis and PIC simulations show that the Weibel instability alone induces only a weak electro-ion coupling in either non-magnetized [Ren, Blackman, and Fong, *Phys. Plasmas*, 14:012901 (2007)] or magnetized plasmas. The two-stream instability alone also provides a weak coupling [Davidson et al., *PRL*, 24:579 (1970)]. However, we will provide 2D PIC simulation results to show distinct stages with different dominant modes during the nonlinear evolution and that the interactions of the two instabilities can be more effective for the electron-ion. This work is supported by the U.S. Department of Energy under Grant Nos. DE-FC02-04ER54789 and DE-FG02-06ER54879.

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