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Temperature equilibration in disparate temperature plasmas
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— The temperature equilibration time for disparate temperature laboratory and astrophysical plasmas is frequently determined by well-understood collisional processes. In turbulent, weakly collisional plasmas, however, there can be significant anomalous energy exchange among species. Such processes might be important, for example, in two-temperature accretion flows conjectured to exist around some supermassive black holes and also in magnetic confinement fusion devices. We explore the possibility of the existence of a turbulent mechanism for temperature equilibration by considering a disparate temperature pair plasma in slab geometry with spatial inhomogeneity. We employ the linear gyrokinetic equation to derive an instability allowed by the ion-electron temperature difference and carry out full nonlinear simulations with the gyrokinetic code GS2 to determine the effect of this instability on the ion-electron temperature ratio. Extensions to conventional (disparate mass) plasmas will be discussed.

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