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The momentum transfer rate due to current-driven turbulence in magnetized plasma

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Nonlinear wave-particle interactions due to plasma instabilities in current layers can cause strong anomalous transport properties of collisionless plasmas. We studied the momentum transfer in the case of strong plasma turbulence by means of Vlasov code simulations. We describe the inertial effects which lead to the formation of large amplitude structures, such as double layers, strong potential drops at the Debye scale. In a companion paper (Lee et al., this session) we present the results of a linear dispersion analysis for conditions typical for coronal current-driven plasmas and here and here we describe the nonlinear saturation mechanism of the linearly unstable waves generated near the ion-acoustic and lower-hybrid frequencies. We analyze the dependence on the propagation angle of the waves. At an early stage of the instability evolution the main contribution to the wave energy is provided by the 64257;eld-aligned wave modes. Later the wave fronts become steeper and steeper and, finally, cause planar double layers. Later, however, obliquely propagating modes takes over. We calculate the effective resistivity due to any term in generalized Ohm's law and consider their relative importance for balancing the electric field.