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Role of resonance broadening vs ion trapping in the microturbulence triggered within the foot of a supercritical quasiperpendicular shock

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Recent 1D PIC simulations [Muschietti and Lembège, 2013] have been used to analyze in detail the wave activity within the foot region of a supercritical perpendicular shock, This turbulence is ascribed to the electron cyclotron drift instability (ECDI) excited by the relative drift of the reflected ion beam versus the electrons (electron Bernstein type instability). It is characterized, in the linear stage, by discrete bands of emission at the gyro-harmonics in agreement with wave dispersion theory. However, in the late nonlinear stage, we show that the power spectra is characterized by a dominant emission at the first gyro-harmonic mainly. This unexpected result does not reflect a «standard» inverse cascade process (shift of power spectra from high k-modes to lower k-modes), but rather results from two complementary wave damping processes: (i) trapping of the reflected ion beam, and (ii) resonance broadening. The latter acts to demagnetize the electrons in the dispersion relation. It initially applies to very high k-modes ($k\rho_e >> 1$) and progressively, as time evolves, to lower k-modes, invalidating the existence of all gyro-harmonics, except the first one. A parametric study will be also presented in order to estimate the impact of each process on the wave emission in the nonlinear stage. Finally, results will be compared with previous works dedicated to the microturbulence within the shock front region.