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## **(I) Nonlinear and noise effects in simulations of Buneman instability**

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The effects of the modification of the electron distribution function in the nonlinear regime of the Buneman instability and statistical noise effects have been investigated, using high-resolution Vlasov and Particle-in-Cell simulations. It is shown that this modification is a result of electron trapping. In nonlinear regimes, electron trapping and associated modification of the electron distribution function result in excitation of waves moving in the opposite direction of the initial drift velocity of electrons (backward waves). In the PIC simulations, however, the modification of the velocity distribution function occurs due to high statistical noise even in the linear stage, so that the observed growth is inconsistent with the linear theory.

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