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The role of initial noise in PIC and Vlasov simulations of the Buneman instability[1] A. TAVASSOLI, O. CHAPURIN, M. JIMENEZ JIMENEZ, T. ZINTEL, M. PAPAHN ZADEH, M. SHOUCRI, R. SPITERI, L. COUDEL, A. SMOLYAKOV, Univ of Saskatchewan — In this work, we analyze effect of the noise in the PIC simulations on the development of the Buneman type instability driven by the relative drift velocity v_0 of the electrons, with respect to the ions in an unmagnetized plasma. We consider a regime of relatively low values of the drift velocity $v_0 = 2v_{te}$. A series of highly resolved PIC simulations with increasingly large number of particles per cell is performed using several different in-house, publicly available, and commercial PC codes. All codes predict very similar growth rates, but several times different from the linear growth rate calculated from the linear theory. We then repeat the simulations for the same system with grid based Vlasov solvers, with low noise level. The results from Vlasov solvers are quite consistent with the exact growth rates from the linear dispersion relation. It has been conjectured that the inherent noise in the initial condition of PIC simulations result in early trapping of the electrons thus affecting the linear growth even at very initial stages. To confirm this effect, the simulations with the Vlasov solvers were repeated but starting with the same initial conditions and the same level of the initial noise as in PIC simulations. In this case, we see the growth of the modes similar to the PIC simulations and inconsistent with the linear theory.

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Andrei Smolyakov
Univ of Saskatchewan

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