Self-similar expansion of plasma into vacuum including thermal ions

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Abstract
Expansion of one dimensional collisionless plasma into vacuum is studied under different initial ions temperature. In this study, a simulation code is used, in which the electrons dynamic is determined by Vlasov equation and the ions dynamic is determined by fluids equations. Finally, the effect of initial ions temperature on the expansion of plasma into vacuum is investigated and the obtained results are compared with self-similar solutions associated with plasma expansion including thermal ions. It is shown that in the area behind the ion front, in which quasi-neutrality conditions exists, the self-similar solutions coincide with the simulation results.

Keywords: plasma expansion, self-similar, ion front, simulation, Vaslov equation

For full article, refer to the Persian section