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Expansion into vacuum of a plasma with a two-temperatures electron distribution function ABDOURAHMANE DIAW, New Mexico Consortium, CENTRE DE PHYSIQUE THEORIQUE- INTERACTION LASER PLASMA TEAM, CENTRE DE PHYSIQUE THEORIQUE- INTERACTION LASER PLASMA TEAM — Recent developments in laser-plasma ion acceleration has renewed interest in plasma expansion into vacuum theory. This phenomenon is usually described by simple 1-D model using the acceleration of ions under the isothermal or adiabatic pressure of hot electrons. However, the electron energy spectra obtained when a short pulse laser interacts with a solid target is generally composed of two temperatures electrons: a hot electrons population (with low density) and a cold electrons population (with a higher density). We will give an overview of a plasma expansion into a vacuum with a two-temperature electron distribution function. Characteristics (amplitude, microscopic structure) of the rarefaction shock which occurs in the plasma when the hot- to the cold-electron temperature ratio is larger than $5 + \sqrt{24}$ are investigated using a semi-infinite plasma. Asymptotic expressions of the quantities of the flow are established in the limit of large temperature ratios. Spatial structures of the ion and electron densities and velocities are presented, together with the prediction of the maximum ion velocity. A second illustration corresponds to the expansion of a thin-foil into a vacuum with a two-temperature electron distribution function.

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