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Sheath and presheath in ion-ion plasmas via particle-in-cell simulation ALBERT MEIGE, LPTP, Ecole Polytechnique, GARY LERAY, JEAN-LUC RAIMBAULT, PASCAL CHABERT — A full particle-in-cell simulation is developed to investigate electron-free plasmas constituted of positive and negative ions under the influence of a DC bias voltage. It is shown that high-voltage sheaths following the classical Child-law sheaths form within a few μs after the DC voltage is applied. Although a characteristic screening length can be defined in the vicinity of the electrodes, the bulk plasma does not appear to be in Boltzmann equilibrium and a Debye length would be more difficult to define. It is also shown that there exists the equivalent of a Bohm criterion with the corresponding presheath accelerating ions collected at one of the electrodes to the sound speed before entering the sheath.

Albert Meige
LPTP, Ecole Polytechnique

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