

Electron acceleration at the termination shock

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The ability of the termination shock as a particle accelerator is totally unknown. Voyager spacecraft data and recent kinetic numerical simulations revealed that the compression ratio of the termination shock is rather low due to the presence of pickup ions, i.e., the termination shock appears to be a weak shock. Nevertheless, two Voyager spacecraft observed not only high energy ions called termination shock particles, which are non-thermal but less energetic compared to the so-called anomalous cosmic rays, but also non-thermal electrons. In this study we focus especially on microstructure of the termination shock and the associated electron acceleration process by performing one-dimensional full particle-in-cell (PIC) simulations. The electron acceleration efficiently occurs through a shock drift acceleration mechanism when a shock angle becomes oblique. In the oblique termination shock a new type of self-reformation is seen even if a relative pickup ion density is not small (30%). Variations of the energy distribution functions of the accelerated electrons are discussed for a couple of parameter sets.

Keywords: termination shock, electron acceleration, PIC simulation