

Electron acceleration at high beta low Mach number collisionless shock

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Voyager spacecraft revealed that the solar wind termination shock is a rather weak shock since the upstream plasma beta is high and effective Mach number of the shock is low due to the presence of pickup ions. Nevertheless, the fluxes of non-thermal electrons and ions (the latter are called as termination shock particles) are enhanced when crossing the termination shock. Electron acceleration at a weak shock is also reported in terms of galaxy cluster merger shocks. In this study we perform two-dimensional full particle-in-cell simulation to discuss microstructure of the high beta and low Mach number shock and the associated electron acceleration. Unlike a one-dimensional simulation, electrons are not reflected at the shock when a shock angle is close to 90 deg. due to the effect of rippling. Nevertheless, some electrons are accelerated locally at the transition region. Wave-particle interactions appear to play a role.

Keywords: collisionless shock, numerical simulation, particle acceleration