

高温イオンを含む無衝突垂直衝撃波の2次元構造

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Two dimensional structure of a collisionless perpendicular shock mediated by hot ions

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It is common in space that a plasma contains hot ions. Velocity distribution function of solar wind protons often show non-thermal tail. Diffuse ions are commonly observed in the terrestrial foreshock. Pickup ions cannot be neglected in the boundary region of heliosphere. In collisionless shocks these hot ions are easily energized and sometimes have great impact on the shock structure. In this study we focus on the impact of the hot ions on the microstructure of a collisionless shock.

Two dimensional microstructure of a collisionless perpendicular shock mediated by hot ions is investigated by using full particle-in-cell simulation. The shock parameters are as follows. Alfvén Mach number is ~ 6 , electron and background ion beta are 0.25 and 0.167, hot ion beta is 20.3, respectively. The relative density of the hot ions is 0.25. The hot ions significantly affect the microstructure of the shock. The shock is relatively stable in comparison with the case without the hot ions. A large scale extended foot is formed due to the reflected hot ions. A variety of waves are generated in the transition region. The largest wavelength among the generated waves in the system is smaller than that in the case without the hot ions. Details of the analysis will be reported.