ピックアップイオンを含む衝撃波の2次元構造

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2D structure of pickup ion mediated shocks

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Pickup ion mediated shocks are observed in heliospheric boundary region such as a solar wind termination shock and interplanetary shocks. The effect of pickup ions in the microphysics of these shocks have not been well understood. We perform two-dimensional full particle-in-cell simulations of the pickup ion mediated shocks. Influence of the pickup ions in the microstructures of shock surface rippling and downstream region for various relative pickup ion densities is examined. When the relative pickup ion density is 25%, the spatial scale of the ripple becomes smaller compared with the case without pickup ions. When further increased the pickup ion density to 60%, the ripple disappears. The downstream of the shock is turbulent because of the instabilities caused by temperature anisotropy. The dominant wavelength of the downstream waves is also largest when no pickup ions are included. On the other hand, the spatial scale of the overshoot-undershoot structure downstream increases as the relative pickup ion density increases. We evaluate temperature anisotropy in each case and discuss the properties of expected instabilities.