

# Forced relaxation of plasma anisotropy by the imposed magnetic field fluctuation and its consequent structure

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In the downstream region of the quasi-perpendicular super-critical shock (the angle between the shock normal and upstream magnetic field larger than 45 degree), plasma temperature anisotropy becomes large due to the presence of specular reflected protons at the shock front. Such plasma configuration is unstable to the mirror mode so that the wave with anti-correlation between the plasma density and the magnetic field amplitude is developed to relax the anisotropy and is carried onto the magnetospheric surface. What we consider in this study is how such processes be modified when some MHD disturbance in the solar wind is given. The magnetosphere experiences variations in the solar wind with the condition after the interaction with the bow shock. We construct the one-dimensional numerical model using a hybrid code where the shock is self-consistently produced and the rotating magnetic field (including rotational discontinuity) is introduced in the upstream region. The rotating component of the field is perpendicular to the background, so that larger perpendicular energy of protons directly turns parallel-distributed as the rotating field penetrates into the shock-downstream. It results in the quick isotropization where the free energy for the mirror or any other instability is suppressed. The process leads to the formation of the stable magnetic hole structure where more particles are accumulated and trapped due to its 'mirror' geometry. We will present the detailed mechanism of this structure, especially the different particle behavior between high and low energy component. Comparison with MHD interpretation and implied observations are also discussed.