Magnetic decrease formation in association with Alfven wave compression by high-speed solar winds

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A formation process of magnetic decreases (MDs) found in interplanetary space is investigated by means of numerical simulations using a hybrid code. MDs are characterized by the diamagnetic structure of a localized weak magnetic field. Since MDs dominantly consist of more anisotropic plasmas than the surrounding region, MDs have been considered as remnants of a mirror instability. Recently, we show the efficient MD formation from a one-dimensional hybrid simulation model, where interplanetary rotational discontinuities interact with a super-critical fast shock (Tsubouchi and Matsumoto, JGR 2005). In this model, the rotational field are imposed on anisotropic plasmas in the shock-downstream, resulting in more rapid isotropization than the mirror instability process. In interplanetary space, however, rotational discontinuities are the consequence of nonlinear Alfven wave evolution. Since MDs are often found in the vicinity of the steepened edge of Alfven waves, Tsurutani et al. suggested a Ponderomotive force which accelerates protons perpendicular to the magnetic field to generate the anisotropy. The present paper focuses on the simulation model that interplanetary high-speed solar wind streams (HSS) compress the propagating Alfven waves. Dominant processes leading to the MD generation will be thoroughly discussed.