

# **Evidence for the generation of MHD- turbulence by energetic storm particles**

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Here we present a study of the MHD-turbulence generation in the IMF fluctuation spectrum observed in the pre-shock front region of an interplanetary shock. We have studied 177 interplanetary shocks recorded aboard the ACE spacecraft between 1998 and 2003. As a result, we have found 19 shock events when the energy density was essentially increased, just before the front, by orders of magnitude (from  $10^{-12}$  to  $10^{-10}$  ergs/cm<sup>3</sup>) in the frequency range of  $10^{-4}$  -  $3.125 \cdot 10^{-2}$  Hz, i.e. sometimes it is comparable to that of the undisturbed large-scale IMF. Thereby, the field and plasma parameters remain undisturbed while considerable fluxes of energetic storm particles are observed. We conclude that generation of MHD-waves and a subsequent increase of the level of small-scale turbulence in the pre-front range are caused by these storm particles.