Abstract Submitted
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Quasilinear Evolution and Perpendicular Ion Heating in the Turbulent Solar Wind LEONID RUDAKOV, Icarus Research Inc. NRL Plasma Physics Division, CHRIS CRABTREE, GURUDAS GANGULI, MANISH MITHAIWALA, NRL Plasma Physics Division — The measured spectrum of kinetic Alfven wave (KAW) fluctuations in the turbulent solar wind plasma is used to calculate the electron and ion distribution functions resulting from quasi-linear diffusion. Quasi-linear diffusion establishes a step-like profile on the distribution function over parallel velocity [1]. The size of "plateau" v_m, which can be created within the time of travel of solar wind plasma to the Earth $\sim 10^5$ s, is estimated for electrons as $v_{me}/v_{te} \sim (10^{-7}t)^{1/6} \sim 0.5$, while for ions $v_{mi}/v_{ti} \sim (10^{-2}t)^{1/7} \sim 3$. In this case the evolution of the ion tail distribution function can be approximated as $f_{tail} \sim t^{-1/7} \exp(-|v_z|^7/v_{mi}^7)$. As a result, the Landau damping of KAW and whistlers in the high beta solar wind plasma is strongly_diminished. Also the ion tail distribution function is found to be unstable to electromagnetic ion cyclotron (EMIC) waves [2]. These waves pitch angle scatter the parallel component of the ion velocity into the perpendicular velocity. With less than 1% of turbulent magnetic field energy in EMIC waves the perpendicular ion heating can be possible. Supported by ONR.

[1] L. Rudakov *et. al.*, Phys. Plasma, **18**, 012307 (2011).
[2] L. Rudakov *et. al.*, arxiv.org:physics.plasm-ph:1012.2398v2, (2011b).

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