

Numerical simulation of energetic particle transport in solar wind

KUBO, Yuki^{1*}, WATARI, Shinichi¹, NAGATSUMA, Tsutomu¹, DEN, Mitsue¹, MURATA, Ken T.¹

¹National Institute of Information and Communications Technology

Solar energetic particles are accelerated at a region of a solar flare and a shock wave in a solar corona and/or a solar wind. Especially, particles can be sometimes accelerated to GeV energy at the flare region and the coronal shock wave. These extremely energetic particles are propagated to the Earth in the solar wind and cause ground level enhancement (GLE). As turbulent magnetic fields exist in the solar wind together with a back ground magnetic field (Parker magnetic field), the energetic particles are transported in the solar wind along the back ground magnetic field suffering pitch-angle scattering by turbulence. The energetic particle transport in the solar wind is often described by a focused transport equation. We have developed a numerical simulation code to solve the focused transport equation to reproduce a particle flux observed near the Earth. In the presentation, we introduce our developing numerical simulation code and give some results of numerical simulations of GeV particle transport in the solar wind.

Keywords: energetic particle, solar wind, stochastic differential equation