Transport of Energetic Charged Particles in the Interplanetary Medium

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The propagation of energetic particles in complex magnetic fields is an important problem in plasma astrophysics. Detailed knowledge of the interaction of charged particles with the turbulent magnetic fields, and of the three-dimensional structure of the magnetic field fluctuations is essential for the understanding of particle transport. The modeling of the particle transport in solar events with numerical methods offers the possibility to derive transport parameters (mean free paths, scattering coefficients) with good accuracy and allows a direct comparison with theoretical predictions which utilize simultaneously observed plasma parameters. Recent progress in the modeling of solar particles will be reviewed, and possibilities to apply the above results to the study of other energetic particle processes in the Heliosphere, including the lateral transport of flare particles, diffusion perpendicular to the magnetic field, and particle transport and acceleration in the presence of interplanetary shock waves will be discussed.