M32b Particle Acceleration in Interplanetary Shocks: Classification of Energetic Particle Events and Modeling

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There are increasing observations of energetic particle events associated with interplanetary shocks. A statistical study of "gradual" solar energetic particle events using data observed by EPAM (Electron, Proton, and Alpha Monitor), SIS(Solar Isotope Spectrometer), and SWEPAM (Solar Wind Electron, Proton and Alpha Monitor) on the ACE is presented. The energetic particle events were classified in four types according to the variance in the flux, the characteristic duration time of the events and the maximum energy of the accelerated particles. We perform the modeling of typical events using numerical simulations to explain the differences in the events. We apply the stochastic differential equation method coupled with the particle splitting to diffusive acceleration, and obtain the energy spectrum and the spatial distribution of the accelerated particles. The relation between the different classes of the events and injection model is described.