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Resonant and diffusive transport of relativistic electrons in Earth's radiation belts[1] DIMITRIS VASSILIADIS, MATTIAS TORNQUIST, West Virginia University, XI SHAO, University of Maryland, College Park, MARK KOEPKE, West Virginia University — Electron transport at field-line resonances and cavity modes is a textbook case of adiabatic motion. Often however such structures are absent so particle scattering is modulated by interplanetary and internal disturbances featuring broadband spectra and resulting in diffusive transport. We discuss the types of relativistic electron transport occurring when FLR structures coexist with stochastic fields. First, test-particle simulations driven with power-law wave spectra are used to show that the diffusion coefficient is a function of the integrated wave power and the spectral index. Second, the excitation of an FLR by compressional-mode waves is simulated in a 2D box model. The combined fields of driver waves and the resonance are used to drive particle transport, and competition between resonant and diffusive scattering depends on driver amplitude and resonance dissipation. Third, global-magnetospheric MHD simulations driven with measured solar wind are used to reconstruct magnetic storm events. Solar wind variations often have near-power-law spectra, and produce low-frequency magnetospheric compressional fluctuations. These waves are used to drive guiding-center electron dynamics in the equatorial plane. Competition between modes of transport is a function of the wave amplitude, polarization, and spectral index; and of the decay rate of stationary resonances on the magnetospheric dayside and flanks. We discuss the fundamental transport types in each case.

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