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Interaction of Charged Particles with Collisionless Shock Ensembles[1] MIKHAIL MALKOV, PATRICK DIAMOND, UCSD — Collisionless shocks are ubiquitous in the solar wind plasma and their interaction with charged particles is an important, long- standing problem. In the de Hoffmann-Teller frame, particle trajectories upstream and downstream are simple, yet the accurate conditions for particle transmission and reflection have been obtained only for the special cases of quasi-perpendicular and quasi-parallel shocks. In the former case the particle magnetic moment is conserved with a good accuracy, which determines the outcome (transmission/reflection) of a particle encounter with the shock. In the general case of an oblique shock, however, the magnetic moment alone is not sufficient and the angle of incidence is essential as well. First, we show that the process of multiple interaction of particles with an individual, infinitely thin collisionless shock may be formulated in terms of an iterated map involving solutions of the spherical triangles. Second, we consider particle interactions with an ensemble of such shocks, which result naturally from wave steepening and are often observed in the solar wind turbulence.

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