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Nonlinear Diffusive Shock Acceleration with Magnetic Field Amplification[1] ANDREY VLADIMIROV, DON ELLISON, North Carolina State University, ANDREI BYKOV, Ioffe Physical-Technical Institute, St. Petersburg, RUSSIA — Recent observations suggest the presence of large magnetic fields in supernova remnants (SNRs), and a likely explanation of these fields is generation of MHD turbulence by shock-accelerated particles. We present a Monte Carlo model of nonlinear diffusive shock acceleration allowing for the production of large-amplitude magnetic turbulence and show preliminary results where the ambient field is amplified by large factors. In addition, we investigate the influence of the dissipation of the turbulence on the flow of plasma and on the injection of thermal particles into acceleration process. This model is the first to include strong wave generation and dissipation, efficient particle acceleration to relativistic energies in nonrelativistic shocks, and thermal particle injection in an internally self-consistent manner. The generation of large magnetic fields in SNRs will strongly influence the production of relativistic ions and electrons and impact broad-band photon observations, particularly the mixture of inverse-Compton and pion-decay emission in the GeV-TeV energy range relevant for GLAST and air-Cherenkov telescopes such as HESS, Veritas and MAGIC.

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