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Fast 3D Reconnection of Weakly Stochastic Magnetic Field: Prospects of the Research ALEX LAZARIAN, University of Wisconsin-Madison, ETHAN VISHNIAC, McMaster University, GRZEGORZ KOWAL, HOANG THIEM, University of Wisconsin-Madison, REINALDO LIMA, University of Sao Paolo — If the necessary requirement for the fast reconnection is the fluid being collisionless, then most of MHD simulations, including those of interstellar medium, do not represent astrophysical reality, as high numerical diffusivity makes reconnection fast for present-day simulations. Fortunately, the model of fast reconnection proposed in Lazarian & Vishniac (1999) does not have these restrictive constraints as it allows for fast reconnection in MHD limit provided that magnetic field is weakly stochastic. As turbulence is ubiquitous in astrophysical environments, weak stochasticity of magnetic field lines is a default state for most of astrophysical magnetic fields. This still leaves a question of what is happening when the magnetic fields are rather laminar. Our research shows that the reconnection itself may increase the level of turbulence resulting in reconnection instability or bursts of reconnection. The most evident application of the model is related to explaining of Solar flares. The predictions of the model above include First Order Fermi acceleration of energetic particles within the extended reconnection layers predicted in the model as well as the removal of magnetic flux during star formation. More astrophysical applications of the process are to follow.

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