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Transport of Poloidal Magnetic Flux Along a Flux Rope in Stratified Solar Subphotospheric Regions[1] JAMES CHEN, JOSEPH HUBA, Plasma Physics Division, Naval Research Laboratory — A three-dimensional (3D) MHD simulation model of vertical, cylindrical magnetic flux rope embedded in a stratified background plasma has been constructed. The initial flux rope consists of a current channel of finite radius and is in non-force-free equilibrium with pressure and constant downward gravity. The poloidal magnetic field is increased in time at the base of the simulation region. The focus of the study is to understand the resulting plasma dynamics inside and outside the current channel, corresponding to relatively low-β and high-β regions, respectively. The role of magnetic reconnection in the evolution of the system is discussed. Fluctuations in density are imposed, and a horizontal flow from the side boundary is allowed. The poloidal flux injected from the base propagates outward and upward, developing highly incoherent structures due to both gravitational effects and the imposed noise. For comparison, similar simulations are carried out for the Gold-Hoyle flux rope. Possible observable manifestations of the transport of poloidal flux through the photosphere are discussed.

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