Abstract Submitted
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Nearly Incompressible Modeling of the Solar Wind[1] G.P. ZANK, Department of Physics and Center for Space Plasma and Aeronomic Research (CSPAR), DASTGEER SHAIKH, Department of Physics and Center for Space Plasma and Aeronomic Research (CSPAR) The University of Alabama in Huntsville — We develop a three-dimensional time dependent numerical model of compressible magnetohydrodynamic fluids describing super-Alfvénic, supersonic and strongly magnetized space and laboratory plasmas show a nonlinear relaxation towards a state of near incompressibility. The latter is characterized essentially by a subsonic turbulent Mach number. This transition is mediated dynamically by disparate spectral energy dissipation rates in compressible magnetosonic and shear Alfvénic modes. Nonlinear cascades lead to super-Alfvénic turbulent motions decaying to a sub- Alfvénic regime that couples weakly with (magneto)acoustic cascades. Consequently, the supersonic plasma motion is transformed into highly subsonic motion and density fluctuations experience a passive convection. This model provides a self-consistent explaination of the ubiquitous nature of incompressible magnetoplasma fluctuations in the solar wind and the interstellar medium.

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