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Magnetosphere-Ionosphere Coupling through Plasma Turbulence in Electrojet[1] Y.S. DIMANT, M.M. OPPENHEIM, Boston University — Field-aligned currents enter the high latitude E-region ionosphere from the magnetosphere causing cross-field electric fields and currents. During periods of intense geomagnetic activity, these fields induce the formation of strong electrojets, plasma instabilities, and turbulence. This turbulence gives rise to intense anomalous electron heating and nonlinear transport which significantly affects the E-region conductivity. Electrojet conductivities play an important role in the Magnetosphere-Ionosphere system. These conductivities determine the polar-cap potential saturation level and the evolution of field-aligned currents. Quantitative understanding of turbulent conductivities and energy conversion issues is important to accurately model magnetic storms and substorms essential for Space Weather predictions. We will present results of recent theoretical efforts of global energy flow, along with results of 2D and 3D fully kinetic, particle-in-cell, simulations. These simulations reproduce many of the observational characteristics of radar signals and provide information useful in accurately modeling plasma turbulence. They demonstrate the significant progress we have made simulating physical processes in E-region electrojets.

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