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Propagation of Rossby-Khantadze Electromagnetic Planetary Waves in the Ionospheric E-Layer[1] S. FUTATANI[2], Ecole Centrale de Lyon/ Universite de Lyon, Ecully, France, T. KALADZE, Vekua Institute of Applied Mathematics, Tbilisi State University, W. HORTON, IFS, University of Texas at Austin, S. BENKADDA, PIIM/CNRS, Aix-Marseille University — Nonlinear vortex propagation of electromagnetic coupled Rossby and Khantadze planetary waves in the weakly ionized E-layer of the ionosphere are investigated with numerical simulations. For each k-vector the linear dispersion relation has two eigenmodes corresponding to the slow magnetized Rossby wave and the fast magnetic Khantadze wave. Both waves propagate westward with speeds of order 10-20 m/s for the slow wave and of order 500-1000km/s for the fast wave. We show that for finite amplitudes there are dipole solitary vortex structures emitted from general initial conditions. These structures are the neutrally stable, nonlinear states that avoid radiating waves by propagating faster than the corresponding linear wave speeds. The condition for these coherent structures to occur is that their amplitudes be such that the nonlinear convection around the core of the disturbance is faster that the linear wave speed for the corresponding dominant Fourier components of the initial disturbance. The presence of the solitary vortex states are indicative of an initial strong disturbance such that arising from a solar storm, a tectonic plate movements or volcanic eruptions.

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