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Mid-Latitude Plasma Density Irregularities and Electromagnetic Wave Scattering V. SOTNIKOV, T. KIM, Sensors Directorate, Air Force Research Laboratory, Wright-Patterson AFB, OH 45433, E. MISHIN, Space Vehicles Directorate, Air Force Research Laboratory, Kirtland AFB, NM 87117, D. ROSE, I. PARASCHIV, Voss Scientific Inc, Albuquerque, NM 87107 — Ionospheric irregularities cause scintillations of electromagnetic signals that can severely affect navigation and transionospheric communication, in particular during space storms. At midlatitudes, such space weather events are caused mainly by subauroral electric field structures (SAID/SAPS) SAID/SAPS –related shear flows and plasma density troughs point to interchange and Kelvin-Helmholtz type instabilities as a possible source of plasma irregularities. A model of nonlinear development of these instabilities based on the two-fluid hydrodynamic description with inclusion of finite Larmor radius effects will be presented. The high-resolution simulations with continuous density and velocity profiles will be driven by the ambient conditions corresponding to the in situ Defense Meteorological Satellite Program (DMSP) satellite low-resolution data during UHF/GPS L-band subauroral scintillation events. These types of density irregularities play important roles in refraction and scattering of high frequency electromagnetic signals propagating in the Earth's ionosphere, inside the plasma sheath of reentry and hypersonic vehicles, and in many other applications.

V. Sotnikov
Sensors Directorate, Air Force Research Laboratory,
Wright-Patterson AFB, OH 45433

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