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Simulations of 3D VLF LH/whistler nonlinear interactions in the topside ionosphere VITALY GALINSKY, VALENTIN SHEVCHENKO, ECE UCSD, EVGENY MISHIN, MICHAEL STARKS, AFRL — Recent observations of the VLF waves with frequencies close to so-called lower hybrid resonance frequency have shown that amplitudes of the observed waves are 20-30 dB smaller than those obtained in VLF propagation models. Nonlinear interactions have been suggested[1] to account for the missing mechanism of energy losses in the current propagation models. Our study[2] of nonlinear induced scattering in electrostatic limit based on a novel 3D code which includes so-called vector nonlinearity pinned the above nonlinear mechanism as a very likely source of this discrepancy. The results virtually reproduce the Demeter satellite observations of intense broadband lower hybrid (LH) electrostatic waves generated by whistler-mode waves from the VLF transmitter NWC. Here we present the results of the extension of the numerical model to electromagnetic (whistler) limit and discuss possible ways of doing the modeling in realistic geometry, essential for obtaining the correct spatial distribution of attenuation of the pump wave emitted from spacecraft through various latitude/longitude as well as altitude regions of the ionosphere.

[1]E. Mishin et al. *Geophys. Res. Lett.*, **37**, L04101, (2010)
[2]V. Galinsky et al. *Geophys. Res. Lett.*, **38**, (2011)

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