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3D Evolution of Lower Hybrid Turbulence in the Ionosphere.[1] GURUDAS GANGULI, CHRIS CRABTREE, Naval Research Laboratory, LEONID RUDAKOV, Icarus Inc. — Three-dimensional evolution of the lower hybrid turbulence driven by a spatially localized ion ring beam perpendicular to the ambient magnetic field in space plasmas is considered. It is shown that the quasi-linear saturation model breaks down when the nonlinear rate of scattering by thermal electron is larger than linear damping rates, which can occur even for low wave amplitudes. The evolution is found to be essentially a three-dimensional phenomenon, which cannot be accurately explained by two-dimensional simulations. An important feature missed in previous studies of this phenomenon is the nonlinear conversion of electrostatic lower hybrid waves into electromagnetic whistler and magnetosonic waves and the consequent energy loss due to radiation from the source region that can result in unique low-amplitude saturation with extended saturation time. It is shown that when the realistic nonlinear effects are considered the net energy that can be permanently extracted from the ring beam is larger. The results are applied to anticipate the outcome of a planned experiment that will seed lower hybrid turbulence in the ionosphere and monitor its evolution.

[1]NRL Base Program

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