

## **Sheet simulation of upper-hybrid oscillations in an inhomogeneous cold plasma in the presence of inhomogeneous magnetic field**

Nidhi Rathee<sup>1,2</sup> and Sudip Sengupta<sup>1,2</sup>

<sup>1</sup> *Institute for Plasma Research, Bhat, Gandhinagar 382428, India*

<sup>2</sup> *Homi Bhabha National Institute, Training School Complex, Mumbai 400094, India*

The effect of inhomogeneous magnetic field on the space-time evolution of upper-hybrid oscillations in a cold inhomogeneous plasma is studied numerically, using a  $1\frac{1}{2}$ -D simulation code based on Dawson Sheet Model ( Phys. Rev. **113**, 383 (1959) ). It is found that the oscillations break via phase-mixing, irrespective of the initial choice of parameters. These results are in sharp contrast with the previously published purely theoretical results ( Phys. Plasmas **20**, 052301 (2013) ), where it was claimed that phase mixing of upper-hybrid oscillations can be avoided for a particular choice of initial conditions. We further present an improved theoretical analysis resulting in a new phase mixing formula, which is in complete agreement with our simulation results. These results are of relevance to laboratory and space plasmas where large amplitude upper hybrid waves are excited through linear/nonlinear mode conversion of ordinary and extraordinary waves.