Conversion of Extraordinary Waves into Upper Hybrid Waves in Inhomogeneous Plasmas

김경섭, 김은화, 이동훈
경희대학교 우주과학과

Inhomogeneity is important in wave coupling and mode conversion. We numerically examine the conversion of extraordinary(X) waves into upper hybrid(UH) waves in inhomogeneous plasmas by using a three-dimensional multi-fluid numerical model. A one-dimensional inhomogeneous density profile is assumed in a cold and collisionless plasma. The density gradient is taken to be perpendicular to the magnetic field. An impulsive input is assumed to excite the X waves in the inhomogeneous box model. In order to solve an initial-valued problem, the finite difference method is used in both time and space. The wave spectra of each electric and magnetic field are presented. Our results suggest that the electromagnetic(EM) wave energy of X wave is converted into the upper hybrid electrostatic(ES) energy wherever the resonant condition is satisfied. We discuss how the mode conversion appears in both electric and magnetic fields by analyzing time history of each component.