EXCITATION OF SURFACE ION CYCLOTRON WAVES BY ALTERNATING ELECTRIC FIELD

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Kinetic theory of parametric excitation of eigen extraordinary polarized waves at the second harmonic of ion cyclotron frequency (SICXM) propagating along plasma boundary is developed. An external alternating electric field operating at the range of ion cyclotron frequency is supposed to be uniform, monochromatic and oriented perpendicularly to an external constant magnetic field, which is oriented parallel to the plasma surface. Boundary condition in the form of discontinuity of SICXM magnetic field, which is determined by non-linear surface electric current flowing along the plasma interface due to mutual influence of transverse alternating electric field oriented across an external magnetic field on the plasma particles located in peripheral plasma region, is formulated. Infinite set of equations for SICXM harmonics has been derived. Analytical solution of this set of equations has been found out in approach of the wave packet consisted of the main harmonic and two nearest satellites. Simple analytical expression for the growth rate of the SICXM parametric instability is found and numerical analysis of plasma parameters influence on its value is carried out. They exceed growth rates of the bulk ion cyclotron waves. Obtained results can be applied for explanation undesirable effects observed in peripheral plasma regions during ICRH regimes. As far as SICXM can propagate both along plasma-vacuum and plasma-metal interfaces, so their excitation can be responsible for such effects as enhancing of plasma-wall interaction and impurity generation.