Transformation processes in strongly magnetized turbulent plasma with upper hybrid pump

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As well known in a medium with certain fluctuation level the propagation of electromagnetic waves can lead to radiation of waves with new frequencies and wavenumbers, i.e. scattered waves and also the new type of waves transformed waves. Obviously the scattering and transformation intensity will be sufficiently large in a non-equilibrium plasma when the level ofturbulent fluctuations is much higher than that of thermal noise.

Let us consider the transformation of transverse electromagnetic waves (t) into longitu- dinal Langmuir oscillations (l) in turbulent magnetized plasma subjected the influence of upper hybrid pump wave. In this case ($t \to l$) the differential transformation cross-section may be written in the form [1] :

$$d\sum\nolimits_{t\to l} = \frac{3}{16\pi^2}\left(\frac{e^2}{mc^2}\right)^2 \frac{\omega'^2\omega''^2}{\omega_{pe}^4} R_{tr} < \delta n_e^2 >_{\vec{q},\Delta\omega} d\omega'' d\mathrm{O} \qquad (1)$$

where $\Delta\omega = \omega' - \omega''$, $\vec{q} = \vec{k}' - \vec{k}''$, $\omega', \vec{k}'$ i $\omega'', \vec{k}''$ are the frequencies and the wave vectors of the incident electromagnetic and transformed Longitudinal waves respectively, dO is the space angle element, and $< \delta n_e^2 >_{\Delta\omega,q}$ is the correlator of the electron density fluctuations at the frequency $\Delta\omega$. The factor R_{tr} has the form

$$R_{tr} = \frac{N''^3 \left|\vec{k}''(\hat{\varepsilon} - 1)\vec{e}'\right|^2}{N'\left(\left|\vec{e}'\right|^2 - \frac{\left|\vec{k}'\vec{e}'\right|^2}{k^2}\right)(\vec{k}''\hat{\varepsilon}\vec{k}')} \qquad (2)$$

where $\vec{e}'$, $\vec{e}''$ and N', N'' are the polarization vectors and refraction indexes of incident and transformed waves, $\hat{\varepsilon}$ is the tenzor of dielectric plasma permittivity in the magnetic field.

We study the situation when $\Delta\omega << \omega' \sim \omega''$. In this case one can neglect the interaction between the incident wave and electron velocity, magnetic and electric field fluctuations, i.e we will take into account only the electron density fluctuations. We shall