FEATURES OF SMBS IN AN INHOMOGENEOUS PLASMA AT TWO-DIMENSIONAL PUMP WAVE LOCALIZATION [[1]](#footnote-1)\*)

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The problem of convective amplification of waves in SBS is considered under conditions when pump waves with frequency ω0, wave vector **k**0, and amplitude *Ε*0 propagate along a plasma layer (axis 0*X*) with dimensions 0<*y*<*L*2, *L*1A<*x*<*L*1B. The projections of the wave vectors of scattered waves (sound and electromagnetic with frequencies ω1, ω2 (*ω*0=*ω*1+*ω*2) and wave vectors **k**1 и **k**2) on the 0*X* axis have different signs. The medium is assumed to be inhomogeneous along the 0*X* axis with a characteristic length *L*0. The phase-matching conditions for wave vectors **k**0=**k**1+**k**2 are satisfied at *x*=0. The case of an arbitrary angle of scattering of an electromagnetic wave *θ* is considered. SMBS is described by a system of shortened equations for scattered waves [1].

, ,

where   is the perturbation of the electron concentration by sound wave,  is the field amplitude of the scattered wave, *V*s, c – group velocities of scattered waves, *β*2=*π*–*θ*, *β*1=*θ*/2; ,  are the coefficients of nonlinear coupling of waves, ,  are the damping coefficients of the scattered electromagnetic and sound waves, *e*, *m*, *N*0 are the charge, mass and the concentration of electrons, *z*, *mi* – are the charge number and mass of ions,  is the phase difference of scattered and sound waves, arising from the plasma inhomogeneity, *χ*(x)=*k*0(*x*)+*k2*(*x*)–*k1*(*x*). It is shown that the scattering process is described by dimensionless parameters, , , and . Exact solutions are obtained for the spatial distribution of the scattered wave amplitude and scattered radiation intensity in the strong dissipation approximation. Calculations show.

At high above-thresholds case, the strongest scattering occurs in the direction along which the wave interaction region has the largest size. If the size of the amplification region for the scattered electromagnetic wave is limited by the inhomogeneity and the characteristic size of the inhomogeneity *L*0 will be larger than the transverse size of the interaction region *L*2, then scattering proceeds in the direction of the 0X axis, otherwise scattering in the transverse direction prevails.

If the pump wave intensity weakly exceeds the threshold, electromagnetic wave amplification in the interaction region is comparable to its attenuation in its vicinity, the angular dependence of the scattered radiation becomes more complex and requires a numerical calculation for each specific case.

Comparison of calculations of the intensity of scattered radiation during SBS according to the obtained formulas with experiment [2], [3] showed their qualitative agreement.

References

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1. \*) [abstracts of this report in Russian](http://www.fpl.gpi.ru/Zvenigorod/XLIX/Pt/ru/GH-Dvinin.docx) [↑](#footnote-ref-1)