reflection from magnetic clouds).

It is possible to realize an explosive-reaction acceleration of a plasmoid with a frozen-in magnetic field by unilateral heating of the plasmoid by means of an electron or microwave beam and pressure of the heated layer on the remaining part of the plasma (the frozen-in magnetic field makes the plasma impenetrable to the expanding heated plasma layer). The pressure of the heated plasma can in this case greatly exceed the pressure of the electron beam itself [7].

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FLEXURE-DRIFT RESONANCE IN SEMICONDUCTORS

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In semiconductors with carriers of one or both signs, in the presence of an external electric field (E) and in general also a magnetic field, there occur the so-called drift waves of the carrier density and field. In the absence of temporal and spatial dispersion, the frequency of these waves equals $\omega = k_i\mu_{ik}E_k = (\vec{k}\cdot\vec{v})$ ($\vec{k}$ - wave vector, μ_{ik} - carrier mobility in the case of charged waves or ambipolar mobility in the case of quasineutral waves). If the frequency greatly exceeds the damping decrement $4\pi\sigma/\varepsilon + Dk^2$ (charged waves) or Dk^2 (quasineutral waves), then these waves attenuate weakly (D, ε, σ - diffusion coefficient, dielectric constant, and electric conductivity). At definite values of the wave vector, the drift branch of the crystal plasma oscillations can cross the branches corresponding to other osicllations in the crystal, provided the frequencies of the latter depend on the wave vector in nonlinear fashion; for example, it can cross the spin, plasma, optical, or flexural waves. If these waves cause crystal plasma oscillations, and the crossing of the frequencies occurs in a region where the wave damping is weak, then it is possible to have a resonant increase of the absorption of the indicated waves, on the one hand, and in the case of non-ohmic contacts also a resonant change of the impedance of the crystal.

We investigate in this paper resonance of a charged drift wave with a flexural wave in the presence of a piezoelectric interaction, in crystals having carriers of one sign. We consider a plate of thickness h (z axis) and length L (x axis) in an external electric field $E = E_x$, with L >> h. If the piezoelectric tensor $\beta_{ik,\ell}$ is homogeneous in the z direction, then it can be shown that the flexural oscillations of the plate do not interact with the drift wave in first approximation in $\beta^2/\rho s^2$. We consider a plate with different values of $\beta_{i,k\ell}$ when z < 0 and z > 0. Using the continuity and Poisson equations and the equation for flexural oscillations [1], and expressing the energy connected with the piezoelectric interaction in the form [2]

$$\int dx dz \beta_{ik\ell} E_i u_{k\ell}$$

($u_{k\ell}$ - strain tensor), we obtain the dispersion equation for the case $|h/L \ll \beta^2/\rho s^2| \sim Dk^2 \ll 4\pi\sigma/\epsilon$:

$$\left[\omega - (\mathbf{kv}) + \frac{4\pi i\sigma}{\epsilon}\right]\left[\omega^2 + 2i\omega\Gamma - a^2 k^4 s^2 h^2\right] = \frac{\beta^2}{8\rho s^2}[\omega - (\mathbf{kv})]k^4 s^2 h^2 a^2$$

(Γ - damping of flexural waves, s - speed of sound, α - factor on the order of unity, determined by the Poisson coefficients). When $k \neq k_0 = v/sh$, this equation breaks up into equations for the flexural and for the drift waves, and the corrections connected with the piezoelectric interaction are small. In the resonance region, when $\omega \approx \omega_0 = v^2/sh\alpha$, we get

$$\omega_1 = \omega_0 - \frac{4\pi i\sigma}{\epsilon} - \omega_0\frac{\beta^2}{16\rho s^2},$$

$$\omega_2 = \omega_0 - i\Gamma + \omega_0\frac{\beta^2}{16\rho s^2} - i\frac{4\pi\sigma}{\epsilon}\,\frac{\beta^2}{16\rho s^2},$$

$$\omega_3 = -\omega_0 - i\Gamma.$$

The absorption of the flexural waves increases strongly when $\Gamma < (4\pi\sigma/\epsilon)\beta^2/16\rho s^2$.

Let us investigate the behavior of the plate impedance $Z = (I')^{-1}\int_0^L E' dx$ (I' - current density). Far from resonance, the corrections depend strongly on the conditions at x = 0 and x = L. We shall assume that the plate is rigidly clamped; for the oscillations of the density n' we assume at x = 0 and x = L the injection conditions $n' = \delta_0 I'$ and assume that the injection is weak, i.e., $\gamma = ev\delta \le 1$. Then, near the resonance frequency $\omega_0 = v^2/sh\alpha$, the relative corrections to the real part of the impedance (the relative corrections to the imaginary part of the impedance is smaller by a factor $(4\pi\sigma/\epsilon\omega)^2$, i.e., they are always small) are given by

$$\gamma\frac{\beta^2}{4\rho s^2}\,\frac{4\pi\sigma}{\epsilon\omega}\,\frac{\omega_0^2}{(\omega - \omega_0)^2 + \left(\frac{4\pi\sigma}{\epsilon} + \Gamma\right)^2}.$$

When $\omega = \omega_0 |\Gamma < 4\pi\sigma/\epsilon|$ this quantity reaches the value

$$\gamma\frac{\beta^2}{4\rho s^2}\,\frac{\epsilon\omega_0}{4\pi\sigma},$$

which can exceed unity. The width of the resonant region is $\Delta\omega \approx 4\pi\sigma/\epsilon \ll \omega_0$.

Let us estimate the required electric field and the resonant frequency. In CdS crystals at $n \approx 10^{10}$ cm^{-3}, $h \approx 0.1$ cm, and $\gamma \approx 1/3$, the required field exceeds 10^3 V/cm; the resonant frequency is of the order of 3×10^7 sec^{-1}. (We note that an analogous effect is possible in the presence of a deformation interaction in piezoelectric crystals.)

In conclusion we indicate that resonance of the drift and plasma or optical branches is impossible, since the crossing of the branches occurs in the region of strong wave damping. Drift-spin resonance leads to relative corrections to the damping and impedance on the order of

$$\max[1 + (\mu H/c)^2](v/c)^2$$

(c - speed of light), and can hardly be measured, owing to the weak interaction between the longitudinal drift and the transverse spin waves.

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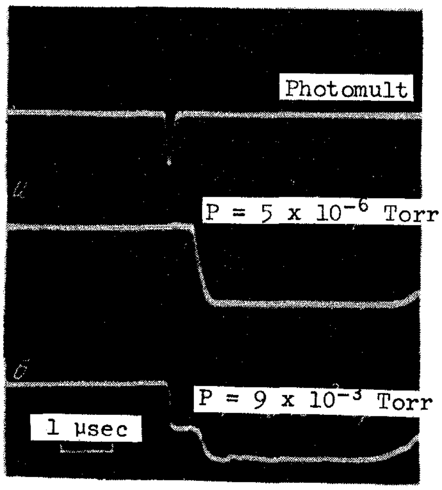
ERRATA

Article by T. U. Arifov et al., Vol. 8, No.3, p. 78.

The correct figure is shown below:



Article by Yu. S. Karimov, Vol. 8, No. 5, p. 146.

Line 5 from the bottom, reads "deviations from nonlinearity,.." should read "deviations from linearity..."

Article by Yu. M. Gufan, Vol. 8, No. 5, p. 167.

Last line reads "paramagnetic phase as an operation...' should read "paramagnetic phase has an operation..."