tion that causes the collision term to vanish. It is clear that when $\omega\tau \ll 1$ the principal approximation is $f_0(\epsilon - \gamma)$, where f_0 is the Fermi function and γ is the chemical potential in the specified external field. When $\omega\tau \gg 1$, and the system does not have time to become attuned, the main approximation is $f_0(\epsilon - \gamma_0)$, where γ_0 is the chemical potential in the equilibrium case.

Calculations confirm all the foregoing estimates. The derivation of exact formulas and comparison with experiment will be the subject of a separate communication.

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SIZE EFFECT ON "INEFFECTIVE" ELECTRONS OF OPEN SECTIONS

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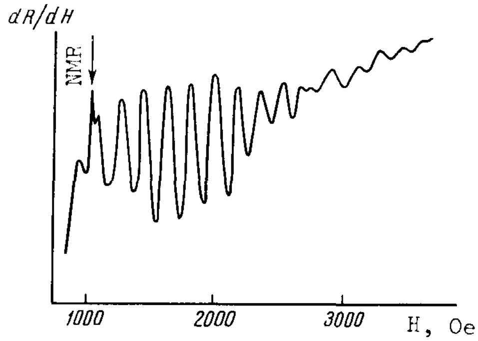
Several recent papers are devoted to investigations of radio-frequency size effects. These effects constitute essentially singularities, periodic in the magnetic field, in the surface impedance of plane-parallel metallic plates. These singularities are connected with anomalous penetration of the high-frequency field into the metal. As shown in [1,2], these anomalies can be explained by considering the interaction of the electrons that move in the interior of the metal with the spatial harmonics of the electromagnetic field, which has a sharp inhomogeneity near the metal surface. If the electron moves on trajectories on which there are points with zero velocity in the interior of the metal, the electrons interact most effectively with those field-spectrum harmonics whose wavelength is an integer fraction of the length of the extremal displacement of the electrons in the interior of the metal. In this case a series of harmonics is separated from the continuous spectrum of the electromagnetic field, and their superposition leads to the appearance of periodic field peaks at distances (from the surface) that are multiples of the extremal displacement of the electrons. The plot of the impedance of a plane-parallel plate against the magnetic field then exhibits sharp singularities, which are priodic in the direct field. If there are no points with zero velocity on the orbit in the interior of the metal, the electrons interact only with the field-spectrum harmonic whose wavelength coincides with the extremal displacement of the electron in the interior of the metal, the sharp field peaks in the interior of the metal are replaced by a harmonic distribution, and the surface impedance of the plane-parallel plate depends harmonically on the magnetic field.

The radio-frequency effect of the first type was investigated in [1-3] on "chains of orbits," on open trajectories, and at limiting points in an inclined field, and the effect of the second type was investigated on helical trajectories in a magnetic field perpendicular to the surface of the metal. Apparently the observed types of size effects do not exhaust all the possibilities that can be realized in metals. In particular, it is possible to observe harmonic oscillations of impedance of plates on "ineffective" electrons in a field parallel to the surface of the metal.

In this paper we present the results of a study of an effect of this type in cadmium. The experiment was made with a sample of cadmium 0.4 mm long, with a plane normal to the [11$\bar{2}$0] direction. The sample was grown in a dismountable glass mold by the method described in [4], from a metal with $R_{4.2°K}/R_{293°K} \approx (2 - 3) \times 10^{-5}$ [1]. It was observed that in a magnetic field lying in the plane of a sample and directed along the [10$\bar{1}$0] axis, the derivative of the surface resistance with respect to the magnetic field dR/dH as a function of the magnetic field has the character of harmonic oscillations (the figure shows a plot of dR/dH).



Plot of the oscillations of dR/dH vs. H. The normal to the surface of the sample and the field are parallel to [11$\bar{2}$0] and [10$\bar{1}$0], respectively; T = 1.7°K.

We propose that this effect is due to the electrons of the periodic open sections of the Fermi surface, and that these electrons are "ineffective." Indeed, according to the data of Alekseevskii and Gaidukov [5] and also of Gavenda and Deaton [6], the Fermi surface of cadmium is open along the [0001] direction, and the electrons drift to the interior of the metal at the given geometry. In addition, the observed oscillations are periodic in the direct field, and the corresponding period in the reciprocal-lattice space, calculated from the formula $K = (e/c\hbar) d\Delta H$, gives a value 1.115 Å^{-1}, which coincides within the limits of measurement error with the height of the Brillouin zone, 1.136 Å^{-1} (d = thickness of sample, ΔH = period of the oscillations).

When the field is rotated 2.5° from the [10$\bar{1}$0] axis in the plane of the sample, sharp lines appear in the plot of dR/dH, in addition to the oscillations, and the number of the oscillations decreases sharply. Starting with 4°, the oscillations are replaced by the sharp size-effect lines connected with the presence of strongly elongated closed orbits passing through several zones. We were able to establish the shape of the particular section of the Fermi surface by studying the angle intervals in which individual lines of this type, observed up to magnetic-field directions parallel to the [0001] axis, can exist, and also by determining the corresponding diameters in momentum space. It turned out that this surface has the form of a corrugated cylinder that is open along the [0001] axis, and the results of the experiment duplicate the corrugations of the surface up to three cycles [2].

Thus, the observed oscillations constitute a size effect on the electrons of the open surface. The harmonic character of these oscillations offers evidence that these electrons are "ineffective."

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1) The authors are grateful to B. N. Aleksandrov for supplying the pure cadmium.

2) These results will be described in detail in an article devoted to an investigation of the Fermi surface of cadmium.

DENSITY CORRELATION NEAR THE CRITICAL POINT

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The purpose of the present note is to determine, within the framework of the phenomenological theory, the dependence on the distance $r = |\vec{r}_1 - \vec{r}_2|$ of the correlation function of the density ρ

$$Q(r) = \langle \rho(\vec{r}_1)\rho(\vec{r}_2)\rangle - \langle \rho \rangle^2 \qquad (1)$$

near the critical point of a liquid-vapor system, using data from thermodynamic experiments. The assumptions under which the calculations are made are similar to those made in [1]. We put

$$\tau = \frac{T - T_c}{T_c}, \qquad \nu = \frac{\mu_c - \mu}{T}, \qquad (2)$$

where T_c and μ_c are the critical values of the temperature T and of the critical potential μ. We consider two kinds of averages: ordinary K_n averaged over the ensemble with $\nu = 0$

$$K_n(\vec{r}_1, \vec{r}_2, \ldots, \vec{r}_n) = \langle \rho(\vec{r}_1)\rho(\vec{r}_2)\ldots\rho(\vec{r}_n)\rangle \qquad (3)$$

and irreducible averages Q_n