anisotropy in the basal plane of the crystal Zn-1 (the curves of Fig. 3), as well as an analysis of the resolved fine structure of the effect in this crystal (the curves of Fig. 4) made it possible to elucidate the complete angular variation of the periods of oscillation of the susceptibility, caused by the larger group of charge carriers, as shown in Fig. 2b. All the fine-structure $\Delta\chi(1/H)$ curves show modulations, with the modulation period decreasing appreciably as θ increases. An analysis of the curves of Fig. 2 shows that the Fermi surface corresponding to this second larger group of charge carriers has quite a complicated shape far removed from the simple scheme of three ellipsoids, rotated in the plane $k_x k_y$ through an angle of $\pm 120°$ relative to each other. It will be the object of further investigations to determine more precisely the shape and the dimensions of the Fermi surface for this group of charge carriers in zinc crystals.

Figure 5 shows the angular dependence of the period of the low-frequency component of the de Haas — van Alphen effect in zinc crystals, studied in this paper and by other authors. It can be seen that for different samples of the same metal the magnitude of the period of oscillations of $\Delta\chi(1/H)$, caused by the smallest group of charge carriers, does not remain constant, with the differences being greatest in the region of small angles θ between the field vector and the principal crystal axis. The periods of oscillation practically coincide in crystals Zn-2, Zn-3, Zn-4 and Zn-7; in the crystal Zn-1 (see also[12]) the periods are appreciably larger.

The facts mentioned above lead to the conclusion that an increase in purity of the samples causes an appreciable increase (up to several tens percent) in the period of oscillation of the susceptibility in the magnetic field, whereas differences in the state of strain of the samples, arising from differences in the method and from thermal conditions during the growth of the crystals, do not have any effect on the magnitude of the period of oscillations. An analysis of the experimental data shows that this conclusion is correct also for the fine structure of the de Haas — van Alphen effect in zinc crystals.

It should be noted that lattice distortions related to the method and conditions of the crystal growth appreciably influence the amplitude of the susceptibility oscillations. The amplitude of the oscillations is largest in the free-grown crystal Zn-7, and is 40 to 50% smaller in crystal Zn-4, obtained under less favorable conditions. On annealing crystal Zn-4, some increase was produced in the amplitude of the susceptibility oscillations.

b. The de Haas — van Alphen Effect in Homogeneously Compressed Zinc Crystals

The crystal Zn-2 was used to investigate the effect of the homogeneous compression of the lattice on the de Haas — van Alphen effect. The second orientation of the crystals has been studied in detail; this is sufficient (see Fig. 2) for a rather complete investigation of the effect of homogeneous compression on the oscillations caused by the smallest group of mobile charges.

Figure 6 shows some $\Delta\chi(1/H)$ curves for the crystal Zn-2 in the second orientation in the field, unconstrained (A) and under homogeneous compression, $p \approx 1700$ kg/cm^2 (B). These curves

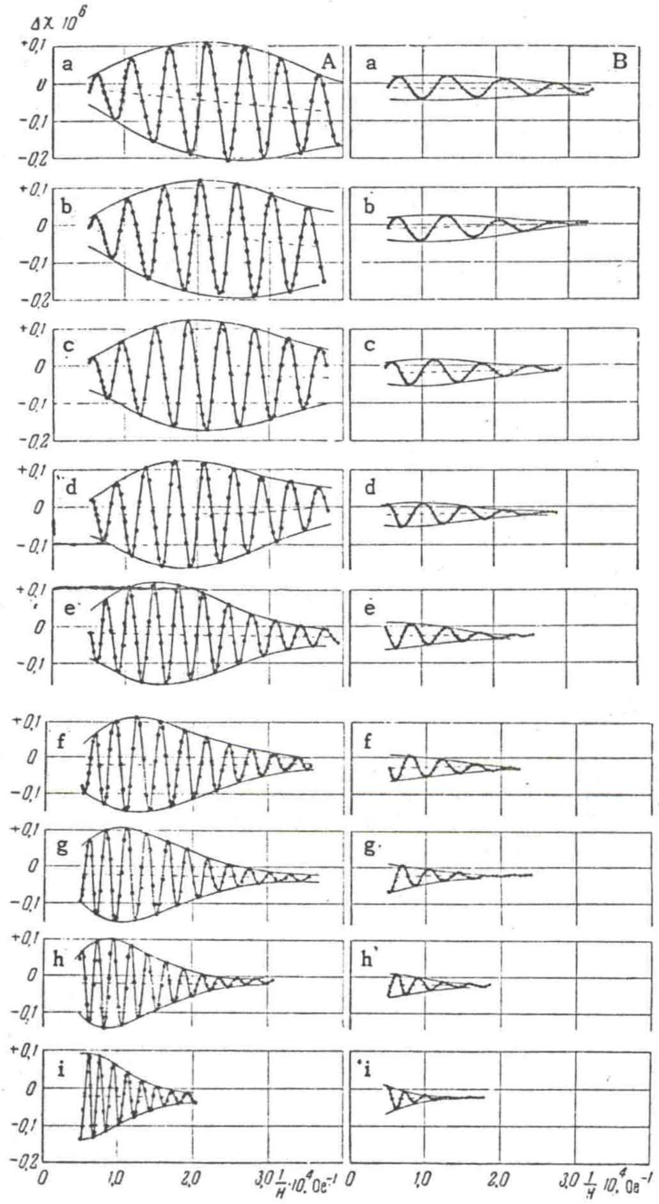

FIG. 6. "Periodic" variation of the susceptibility of the crystal Zn-2 with the magnetic field: A) unconstrained crystal, B) homogeneously compressed crystal at p = 1700 kg/cm^2; a – θ = 10°; b – θ = 20°; c – θ = 30°; d – θ = 40°; e – θ = 50°; f – θ = 55°; g – θ = 60°; h – θ = 65°; i – θ = 70°; T = 4.2°K.