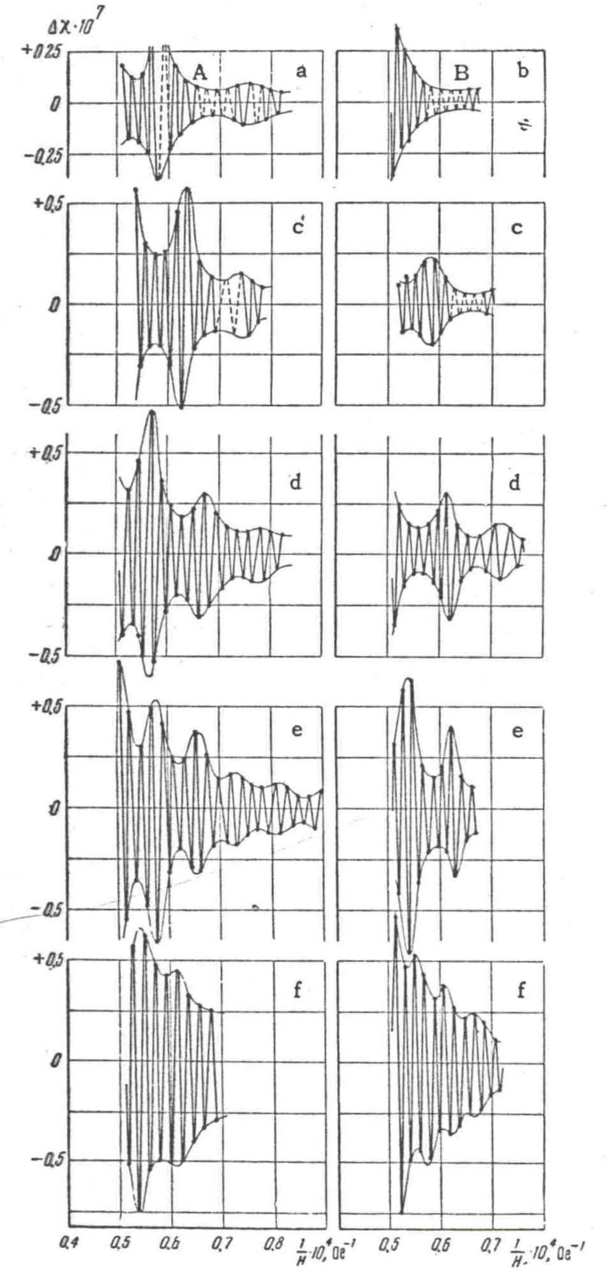

FIG. 4. Resolved oscillations of the high frequency component of the de Haas – van Alphen effect (fine structure): A) in the first, and B) in the second orientation of the crystal Zn-1: a – θ = 75°; b – θ = 78°; c – θ = 80°; d – θ = 82°; e – θ = 85°; f – θ = 88°; T = 4.2°K.

Alphen effect it was necessary to establish more accurately the angular dependence of the periods of susceptibility oscillations, caused by different groups of charge carriers in unconstrained zinc crystals.

The curves of Fig. 2 illustrate the angular dependence of the periods of oscillation of the susceptibility for three orientations of the zinc crystals in the magnetic field.

From the preceding investigations of the crystal Zn-1 it is known[12] that when the sample is oriented in the magnetic field in either the first or second direction, the smallest group of charge carriers produces practically coinciding curves for the angular dependence of the period of oscillation of the susceptibility of zinc. This fact was checked more carefully by an investigation of the crystal Zn-7. The curves of Fig. 2a represent the angular dependence of the periods of oscillation of the susceptibility in this crystal, produced by the smallest group of charge carriers, for the first (1) and the second (2) orientations in the magnetic field respectively. It can be seen that the curves coincide over practically the whole range of values of θ. This smallest group of carriers does not appear at all when investigating the magnetic properties in the basal plane of the zinc crystals. All the above favors the assumption that the Fermi surface for the charges of this group is a surface of revolution elongated along the axis k_z, which approximates an ellipsoid of revolution over a wide range of angles $0 < \theta \leq 60°$, and for large θ changes gradually first to a cone, and then to a cylinder.[14]

The anisotropy of the magnetic properties of zinc crystals in the basal plane is due to the same group of charge carriers that is responsible for the fine structure of the effect in the first and second orientations of the zinc crystals in the magnetic field. In fact, an analysis of the magnetic

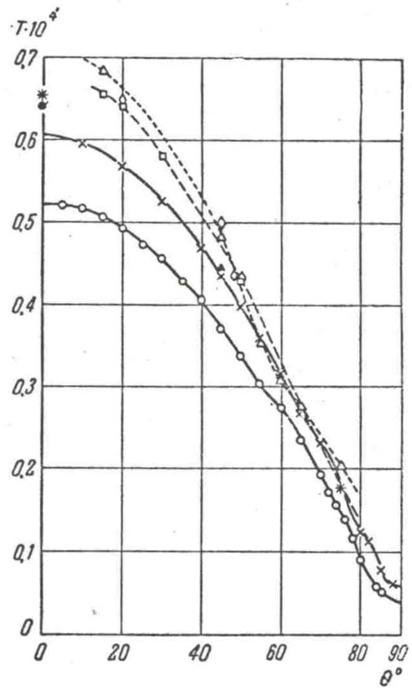

FIG. 5. Angular dependence of the oscillation period of the susceptibility caused by the smallest group of mobile charges in different zinc crystals, obtained from: × – crystal Zn-1, ○ – crystals Zn-2, 3, 4, 7 (this paper); ▲ – Sidoriak and Robinson,[18] △ – Mackinon,[19] ● – Berlincourt and Steele,[20] □◇ – Donahoe and Mix,[21] * – Dhillon and Shoenberg.[22]