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Anisotropy of Magnetoresistance in $Pb_{1-x}Sn_xTe$

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It is known that the energy spectra of lead and tin chalcogenides are complicated (1). Therefore one can assume that such materials in sufficiently strong magnetic fields will show a significant anisotropy of galvano-thermo-magnetic effects. It is also obvious that the compounds of the $Pb_{1-x}Sn_xTe$ system having zero energy gap are most convenient for evidencing this anisotropy.

Below we present the results of magnetoresistance investigations at 77.3 °K in magnetic fields up to 3 T for a number of p-type specimens with $x = 0.18$ ($p = 10^{17}$ to 10^{18} cm^{-3}). The angular diagram in transverse magnetic fields and the longitudinally transverse diagram as well as the magnetic fields dependences in principal crystallographic directions have been studied. As it is seen from the diagram represented in Fig. 1 in the case of current $\vec{j}$ directed along [100] an observable anisotropy of magnetoresistance takes place already in fields of the order of 0.5 T, and in fields of 3 T we have $\varrho_{[011]}(\vec{B})/\varrho_{[001]}(\vec{B}) = 1.6$. Note that at rotation of the magnetic field in the (001) or (011) plane the longitudinally transverse diagram has an isomorphic structure despite the difference in the magnitudes of $\varrho_{ij}(\vec{B})$ in strong fields $\vec{B} \nparallel \vec{j}$.