High-frequency impedance of layered conductors in a quantizing magnetic field

O. Kirichenko and I. Kozlov

B.Verkin Institute for Low Temperature Physics and Engineering, National Academy of Sciences of Ukraine, Lenin Ave.47, 61103, Kharkiv, Ukraine, E–mail: kirichenko@ilt.kharkov.ua

The propagation of electromagnetic waves in layered conductors placed in a strong magnetic field **B** is studied theoretically in a wide range of the wave frequencies and at low temperature, when charge carriers are scattered mainly by impurity centers. By means of the Kubo method we have derived the surface impedance of a layered conductor under the condition when the separation $\hbar\omega_c$ between energy levels of electrons is much less than their chemical potential μ. The quasi-two-dimensional nature of the electron energy spectrum of layered conductors results in peculiar oscillatory dependence of the impedance on the inverse value of the magnetic field. The form of beats is typical for the oscillations arising from the quantization of orbital motion of charge carriers that possess the Q2D dispersion law. These oscillations are formed by the interference of the harmonics with the frequencies determined by the extreme-areas cross sections of the Fermi surface. Along with the beatings the low-frequency oscillations occur in layered conductors, their amplitude is small but decays weakly with temperature because the temperature smearing of the Fermi distribution function does not lead to a decrease in the amplitude of the oscillations. The shift of the the low-frequency oscillations phase is analyzed. The low-frequency fraction of the quantum oscillations may be observed at temperatures where the basic harmonics are utterly small.