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Time-Dependent Conductivity in the Quantum Hall Effect MANABU MACHIDA, NAOMICHI HATANO, The University of Tokyo, Japan, JUN GORYO, Aoyama Gakuin University — We analyze the quantum Hall effect in a 2D electron system with a periodic potential. We show that the conductivity begins to oscillate in time when an electric field is suddenly switched on. Assuming linear response, we obtain an analytical expression of the time-dependent conductivity. The time dependence comes theoretically from the Fourier components of the response function with nonzero frequencies. The amplitude of the oscillation gradually decreases as a function of time and the conductivity eventually approaches to its average, which is given by the Chern number according to the Kubo formula. We numerically calculate the temporal oscillation of the conductivity in the case of a superlattice in a semiconductor. We find that both the Hall and diagonal conductivities oscillate with a period of pico to nano seconds.

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