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Terahertz Space-Charge Field Oscillations in Multilayer Semiconductor Heterostructures YURI GLINKA, Vanderbilt University, DENIS MARYENKO, JURGEN SMET, Max-Planck-Institut für Festkörperforschung — We report the first observation of few-cycle terahertz oscillations in cross-beam photocurrent signals from GaAs/LT-GaAs, which are due to the space-charge field oscillations in LT-GaAs layer. The experimental setup for simultaneous measurements of the cross-beam photocurrent and pump-probe reflection change has been used. The frequency of oscillations is tunable with the thickness of the LT-GaAs layer. Two effects contribute to the signals: (1) the photocurrent autocorrelation, and (2) the memory effect. The oscillations arise due to the dynamical reverse of interfacial field between GaAs substrate and LT-GaAs layer resulted from different electron relaxation times in the materials. The dynamical reverse of the field induces the Dynamical Franz-Keldysh effect (DFKE) also appeared in pump-probe reflection change measurements. The effect of the interfacial field induced DFKE on ultrafast carrier dynamics in multilayer heterostructures is discussed.

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