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**Evolution of coherently controlled charge and spin currents injected by optical pulses.**[1] R. ABRAROV, A. NAJMAIE, E. YA. SHERMAN, J. E. SIPE, Department of Physics and Institute for Optical Sciences, University of Toronto, St. George Street 60, Toronto, Ontario, Canada, DEPARTMENT OF PHYSICS AND INSTITUTE FOR OPTICAL SCIENCES, UNIVERSITY OF TORONTO, ST. GEORGE STREET COLLABORATION — We consider dynamics of coherently controlled currents injected by short (100 fs) optical pulses with frequencies $\omega$ and $2\omega$ in multiple GaAs/AlGaAs quantum wells. Our approach is based on the series expansion of the carrier and current densities in an appropriate set of basis functions. The role of space-charge effects (long-range Coulomb interaction between electrons and holes) and current-conserving and non-conserving collisions of the carriers on the dynamics of the quantities observable in pump-and-probe experiments is investigated. We show that under certain conditions, dependent on the relaxations rates and the band structure effects, displacement of electrons and holes from the initial positions can be finite even on a long time scale of the order of few picoseconds. Due to the skew scattering arising during electron-hole collisions, injected charge (spin) currents drive the spin (charge) currents which can be observed experimentally.

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