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Three- to two-dimensional crossover in time-dependent density-functional theory[1] SHAHRZAD KARIMI, CARSTEN ULLRICH, University of Missouri — Quasi-two-dimensional (2D) systems, such as an electron gas confined in a quantum well, are of great theoretical interest and practical importance. Earlier studies of the crossover from 3D to 2D in ground-state density-functional theory have shown that local and semilocal exchange-correlation functionals which are based on the 3D electron gas as reference system work well for wide quantum wells, but eventually break down as the true 2D limit is approached. We now consider the dynamical case and study the performance of various linear-response exchange kernels in time-dependent density-functional theory. We compare approximate local and orbital-dependent exchange kernels with time-dependent Hartree-Fock theory for n-doped quantum wells, and analyze their behavior for intersubband charge and spin plasmons as they cross over from the quasi-2D to the bulk plasmon regime.

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