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Definition of current density in presence of AC electric field ZHANG LEI, WANG JIAN, Department of Physics, University of Hong Kong — Under time varying AC electric field, the transport problem becomes complicated due to the presence of displacement current. The conventional current density calculated by using the formula $J_c = \frac{e}{2m}[((p-eA)\psi)^*\psi - \psi^*((p-eA)\psi)]$ is not conserved, which means $\nabla \cdot J_c(r,t) \neq 0$. In order to solve this problem, we will give a new definition of current density by using non-equilibrium Green's function which includes the contributions from the Coulomb interaction in low frequency limit. And we will show that the current calculated from the current density is conserved.

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