Abstract

The Fröhlich – type Hamiltonian of two dimensional plasmaron, the dressing of electron by virtual plasmons, is formulated in terms of Feynman path integral. It is shown that the average propagator can be evaluated using the so-called cumulant expansion method. The average propagator is then used to obtain the ground state energy of the plasmaron. Two parameters ρ and E_v of the ground state energy have to be varied separately to yield the actual ground state energy. However, minimizing with these two parameters cannot be in closed forms and numerical method must be employed. It is shown that for weak coupling, $r_s \to 0$, the ground state energy will reach when the parameter E_v is rather high. For higher r_s, the lower E_v is required to yield ground state energy. For strong coupling, $r_s \to \infty$, the ground state energies are always positive for all values of E_v. It is also found that only the range of ρ between 1 and 2 that is suitable.