Intense field ionization of diatomic molecules in the tunneling region. ZI JIAN LONG, WING-KI LIU — There are two theoretical approaches to study the strong field ionization of molecules.One is based on a static picture in which the electron is considered to tunnel out through a potential barrier (ADK Theory [1]). In this approach the time dependence of laser field is taken into account by averaging the static ionization rate over time. A simple ionization formula can be obtained and it well predicts the experimental result in the tunneling region. Another theoretical approach is the time-dependent picture based on an S-matrix formulism. An essential feature of this approach is Strong Field Approximation (SFA). We expect that in the tunneling region the SFA will give similar analytical expression as in the ADK theory. Much work has been done in the atomic case to demonstrate that the SFA asymptotically gives ADK tunneling rate [2]. Here we study the strong field ionization of simple diatomic molecules in which the electronic wave functions will be represented by linear combination of atomic orbitals (LCAO). We will consider the ionization rate in tunnelling regime for diatomic molecules and investigate the interference effects between different atomic orbitals. We will compare our asymptotic formula with numerical calculation for simple systems.
[1]Ammosov, Delone, Krainov Sov. Phys. Jept. 64 1191
[2]L. V. Keldysh Sov. Phys.Jept. 20 1307

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