Trajectories of charged microparticles in a linear quadrupole trap with a rectangular potential

Dobroklonskaya M.S.[1,@]

[1] Joint Institute for High Temperatures of the Russian Academy of Sciences, Izhorskaya 13 Bldg 2, Moscow, 125412, Russia

[@] mdobro@jiht.ru

A new application of electrodynamic traps can be the rapid determination of the size and charge of particles from trajectories of motion in air, as well as the study of chaotic particle motions that can arise from simple oscillations. The behavior of Coulomb systems and individual microparticles in a quadrupole linear trap is well studied for the harmonic form of the confinement voltage. In the case of harmonic voltage, only amplitude and frequency can be changed to influence the held particles, while in the case of rectangular voltage form, additional variable parameters are: different durations of positive and negative pulse while keeping the total duration of the period constant, as well as different amplitudes of positive and negative polarity pulses.

The trajectories of micron-sized charged particles in a linear quadrupole trap in air with a new form of potential in the form of rectangular alternating periodic pulses at the linear electrodes of the trap have been investigated. The shapes of trajectories of charged dielectric particles of micron size at rectangular pulse confinement voltage with different filling factors of the positive polarity of the pulse have been experimentally and numerically obtained.