

Trajectories of charged microparticles in a linear quadrupole trap with a rectangular retaining voltage

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Received 5.07.2024; revised 22.07.2024; accepted 2.08.2024

The influence of alternating rectangular confinement voltage on the oscillation trajectories of charged micron dielectric particles in a linear quadrupole trap in air at atmospheric pressure at varying the positive polarity duty factor of the pulse has been investigated experimentally and by computer modeling method. Variation of this duty factor was found to change the inclination angle of particle trajectories in the cross section of the trap at constant signal frequency and amplitude. Changing the fill relative to 50 % up and down also changes the diagonal of the trajectory in the cross section. The experimentally detected effect of trajectories inclination rotation agrees with the results of computer modeling for a single particle. The discovered effect can be used to control single particles and Coulomb systems of charged particles, identify new areas of stability, and develop quantum computers based on quadrupole traps.

Keywords: charged particles, linear electrodynamic quadrupole trap, particle trapping, trajectories of motion, air at atmospheric pressure, rectangular voltage.

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