Abstract:

In a hyperbolic quadrupole trap, with a time varying potential applied to its electrodes, stable ion trajectories can be described by the solution of the Mathieu Equation. This solution can be found for a selected ion by adjusting the frequency, the frequency’s amplitude, and a potential offset applied to the trap’s electrodes. We use the “SIMION” program to compute ion trajectories under different geometric specifications. By creating a hyperbolic quadrupole trap in the program, we can view the motion of ions in the trap. We have found that the ion trajectories calculated in the program are consistent with the predictions made by the Mathieu Equation for the trapping of ions. We plan to extend this study to a radio-frequency ion trap with cylindrical geometry.