

Interactive Presentations (IP)
Topic 2 - Interactive Presentations (2)

Author: Ms. Anastasiia Fursova
Skolkovo Institute of Science and Technology, Russian Federation, anastasia.fursova@skolkovotech.ru

Prof. Evgeny Nikolaev
Skolkovo Institute of Science and Technology, Russian Federation, E.Nikolaev@skoltech.ru

VIBRATION ANALYSIS OF THE 3D-PRINTED HIGH-RESOLUTION MULTIPLE ELECTRODE
HARMONIZED KINGDON TRAP

Abstract

Mass spectrometers are widely used for space exploration and analysis of the interplanetary medium and upper and lower planetary atmospheres, the chemical composition of planets, and small body environments. It is an instrument for the determination of the material substance chemical composition that is based on the identification of compounds through accurate mass measurements of their molecules. Now, we work on the device that can analyze the Moon soil in the polar regions and give us an answer on the question of the water existence and the composition of ice inclusions there.

As was shown [1], the new type of mass spectrometers, based on Kingdon Ion Trap, provides a high precision of mass measurements. However, the ion trap needs a high accuracy of manufacturing and assembly. The small displacement of the ion trap parts could ruin analytical parameter of the device, affect the work process and increase an error in the results.

High precision instruments like mass spectrometer could be easily damaged during the mission. The most destructive load that will affect the ion trap geometry during the launch and landing is vibration. It can move axis of symmetry and decrease resolving power of the mass spectrometer.

The goal of this research is to create a precise 3D model of the ion trap with high vibration stability and conduct vibration analysis with the values of the parameters corresponding to the conditions of the launch. The tests validate the results of the work. We are reporting the results of vibration analysis of the 3D printed Kingdon Ion Trap prototype.

References:

[1] Nikolaev E. et.al. (2018). "Multi-electrode harmonized Kingdon traps". Journal of The American Society for Mass Spectrometry