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Design and simulation of the parameters affecting the ion beam characteristics from a penning ion source

M Moslemi Poorkani, E Ebrahimi Basabi and M Sohani

Faculty of Physics and Nuclear Engineering, Shahrood University of Technology, Shahrood, Iran

E-mail: e.ebrahimi@shahroodut.ac.ir

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Abstract

Today, many different kinds of ion sources have been developed. One of the most important ones is the penning or PIG ion source. Due to its simplicity of structure and longer lifetime, these ion sources are more widely considered than other ones. In this paper, design and simulation of the parameters affecting the ion beam characteristics from a penning ion source are performed using the CST software. Among the various structures of the permanent magnet around the source, the circular arrangement is found to be better for the confinement of particles inside the source. The electric potential of the anode, the cathode and the extraction electrode are found to be 15+, -500 and -3000 Volt, respectively. The decelerator and accelerator electrodes are used as ion source extraction systems. In addition, in the beam transport systems, high efficiency focusing in Einzel lens is more than that of immersion lens.

Keywords: ion source, extraction system, electrostatic lens, CST software

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