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Accessibility Condition on Waves Propagation and Multicharged Ion Production in Electron Cyclotron Resonance Ion Source Plasma

Yushi Kato, Keisuke Yano, Takuya Nishiokada, Tomiki Nagaya, Sho Kumakura, Yota Imai, Shogo Hagino, Takuro Otsuka, and Fuminobu Sato

Division of Electrical, Electronic and Information Engineering, Graduate School of Engineering, Osaka Univ.

2-1 Yamada-oka, Suita-shi, Osaka 565-0871, Japan

Corresponding Author: Yushi Kato, e-mail address:kato@eei.eng.osaka-u.ac.jp

A new tandem type source on the basis of electron cyclotron resonance (ECR) plasma has been constructing for producing synthesized ion beams in Osaka Univ.[1] Magnetic mirror field configuration with octupole magnets can be controlled to various shape of ECR zones, namely in the second stage plasma to be available by a pair mirror and a supplemental coil. Noteworthy correlations between these magnetic configurations and production of multicharged ions are investigated in detail, as well as their optimum conditions. Interaction between plasmas and waves in magnetized plasma is essential issues for enhancing various kinds of resonance wave heating. We have been considered accessibility condition of electromagnetic and electrostatic waves propagating in ECR ion source (ECRIS) plasma, and then investigated their correspondence relationships with production of multicharged ions. It has been clarified that there exists efficient configuration of ECR zones for producing multicharged ion beams, and then has been suggested that new resonance, *i.e.* upper hybrid resonances, must have occurred. We are planning new advanced experiments inducing actively these additional effects for enhanced furthermore multicharged ion beams with launching extra-ordinary (X) mode waves.

References

[1] Y. Kato, Y. Kurisu, D. Nozaki, K. Yano, D. Kimura, S. Kumakura, Y. Imai, T. Nishiokada, F. Sato, and T. Iida, Review of Scientific Instruments, 85(2014)02A950-1-3.