

加速器

Experimental results of helicon sources

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摘要

Helicon plasma sources are known as efficient generators of uniform and high density plasma. A helicon plasma source was developed for the investigation of plasma stripping and plasma lenses at the Institute of Modern Physics, CAS. In this paper, the characteristics of helicon plasma have been studied by using a Langmuir four-probe and a high plasma density up to $3.9 \times 10^{13}/\text{cm}^3$ has been achieved with the Nagoya type III antenna. In the experiment, several important phenomena were found: (1) for a given magnetic induction intensity, the plasma density became greater with the increase of RF power; (2) helicon mode appeared at RF power between 300 W and 400 W; (3) the plasma density gradually tended to saturation as the RF power increased to the higher power; (4) a higher plasma density can be obtained by a good match between the RF power and the magnetic field distribution. The key issue is how to optimize the matching between the RF power and the magnetic field. Moreover, some tests on the extraction of ion beams were performed, and preliminary results are given. The problems which existed in the helicon ion source will be discussed and the increase in beam density will be expected by extraction system optimum.

关键词

[helicon sources](#), [plasma density](#), [Langmuir four-probe](#)

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