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Study on Discharge Characteristics of High Power RF Ion Source with Dual-Drive for Neutral Beam Injector

In order to meet the requirement of the neutral beam long pulse operation for CFETR and fusion reactor, it is urgent to carry out the research of high power RF ion source. As the extracted area of ion source is bigger, multi-driver is an inevitable choice. According to the structure of multi-driver, some problem such as, disturb between adjacent drivers and plasma uniformity, will occur. These problems are key issue which restrict the stable-state operation of ion source. In this proposal, firstly, the electromagnetic field's distribution of multi-driver for high power RF ion source is analyzed and the mutual electromagnetic interference among multi-driver is researched and the optimized design is obtained; Secondly, the plasma discharge model of multi-driver RF ion source is established based on the first step, the influence on the plasma stability and uniform discharge is investigated and a corresponding discharge control method is proposed to compensate for the mutual interference during multi-driver discharge. Finally, combined with the simulation results, the discharge experiment of dual-drive RF ion source was carried out based on the RF ion source test platform. By optimizing the discharge control method, the goal was to obtain stable and uniform plasma discharge of dual-drive RF ion source.

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Yes

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