Contribution ID: **69** Type: **Poster**

Development of advanced electromagnetic PIC code for the study of RF negative ion sources

Monday, 8 September 2025 16:30 (1h 30m)

In the operations of the Radio Frequency (RF) negative hydrogen ion sources, temporal oscillation of the H- ion beam has been a significant issue in the particle accelerator or the fusion applications from a viewpoint of the beam optics. Especially, it is pointed out that temporal oscillation of the plasma meniscus may degrade the beam optics. In order to clarify the underlying physics and settle the issue, we are developing the integrated model of RF inductively coupled H- source plasma, beam extraction, and acceleration with three-dimensional particle-in-cell (PIC) method. In this numerical model, not only electromagnetic field but also electrostatic field are obtained by solving Maxwell and Poisson equations. Thus, the plasma meniscus can be solved self-consistently in the simulation. The details will be shown in the conference.

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Session Classification: Poster Session

Track Classification: Negative ion sources and sources for fusion facilities