

Research of Plasma Simulation in Electric Propulsion Devices

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● Abstract

The purpose of this research is to investigate the effect of the state of the lanthanum hexaboride insert responsible for thermal electron emission from the hollow cathode used as an electron source in electric propulsion on ionization instability (plume mode).

● Reasons and benefits of using JAXA Supercomputer System

JSS3 was used to execute plasma simulation using Hybrid-PIC. The computational resources of JSS3 were required to investigate the influence of a variety of parameters on the solution.

● Achievements of the Year

The influences of the properties of the LaB6 insert, such as the insert work function and the insert surface temperature distribution, on the flow field of the hollow cathode was numerically investigated using Hybrid-PIC method. The results indicated that increasing work function results in growth of the ionization instability(plume mode). As for the surface temperature distribution, it was shown that the flow tends to be stable, namely "spot mode", as the temperature of the downstream tip becomes higher.

● Publications

N/A

● **Usage of JSS**

● **Computational Information**

Process Parallelization Methods	MPI
Thread Parallelization Methods	N/A
Number of Processes	12
Elapsed Time per Case	6 Hour(s)

● **JSS3 Resources Used**

Fraction of Usage in Total Resources*1(%): 0.00

Details

Computational Resources		
System Name	CPU Resources Used (core x hours)	Fraction of Usage *2(%)
TOKI-SORA	0.00	0.00
TOKI-ST	17,245.55	0.02
TOKI-GP	0.00	0.00
TOKI-XM	0.00	0.00
TOKI-LM	0.00	0.00
TOKI-TST	0.00	0.00
TOKI-TGP	0.00	0.00
TOKI-TLM	0.00	0.00

File System Resources		
File System Name	Storage Assigned (GiB)	Fraction of Usage* ² (%)
/home	780.00	0.71
/data and /data2	150.00	0.00
/ssd	150.00	0.02

Archiver Resources		
Archiver Name	Storage Used (TiB)	Fraction of Usage* ² (%)
J-SPACE	0.00	0.00

*1: Fraction of Usage in Total Resources: Weighted average of three resource types (Computing, File System, and Archiver).

*2: Fraction of Usage : Percentage of usage relative to each resource used in one year.

● **ISV Software Licenses Used**

ISV Software Licenses Resources		
	ISV Software Licenses Used (Hours)	Fraction of Usage* ² (%)
ISV Software Licenses (Total)	0.00	0.00

*2: Fraction of Usage : Percentage of usage relative to each resource used in one year.