Next-Generation Ion Thruster Design Tool

To support future space missions

Computational tools that accurately predict the performance of electric propulsion devices are highly desirable and beneficial to NASA and the broader electric propulsion community. The current state of the art in electric propulsion modeling relies heavily on empirical data and numerous computational "knobs."

In Phase I of this project, Tech-X Corporation developed the most detailed ion engine discharge chamber model that currently exists. This kinetic model simulates all particles in the discharge chamber along with a physically correct simulation of the electric fields. In addition, kinetic erosion models are included for modeling the ion-impingement effects on thruster component erosion.

In Phase II, Tech-X developed a user-friendly computer program for NASA and other governmental and industry customers. Tech-X has implemented a number of advanced numerical routines to bring the computational time down to a commercially acceptable level. NASA now has a highly sophisticated, user-friendly ion engine discharge chamber modeling tool.

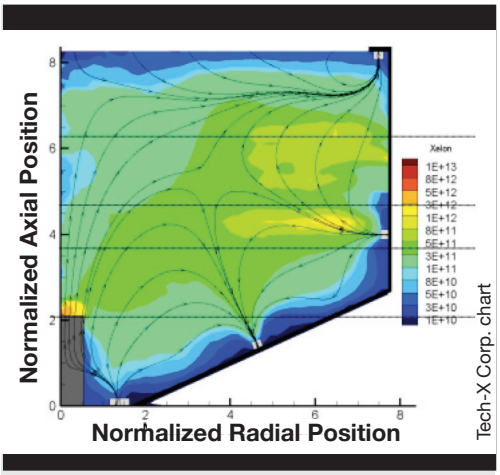
Applications

NASA

- 40-cm-diameter NASA's Evolutionary Xenon Thruster (NEXT)
- Hall thrusters, such as the high-voltage Hall accelerator (HiVHAC) thruster

Commercial

- Electric propulsion
- Military and commercial satellites:
  - Satellite station keeping
  - Orbit-changing maneuvers in space
- Ion source and plasma processing



Phase II Objectives

- Reduce computational time of new modeling tool
- Make new modeling tool user friendly and commercially attractive

Benefits

- Reduces time and expense in designing new/different sizes of ion engines
- Analyzes existing ion engine performance
- Extends the operating range of the NEXT ion engine to higher power levels

Firm Contact

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