

Kinetic Molecular Dynamic Model of Hall Thruster Channel Wall Erosion
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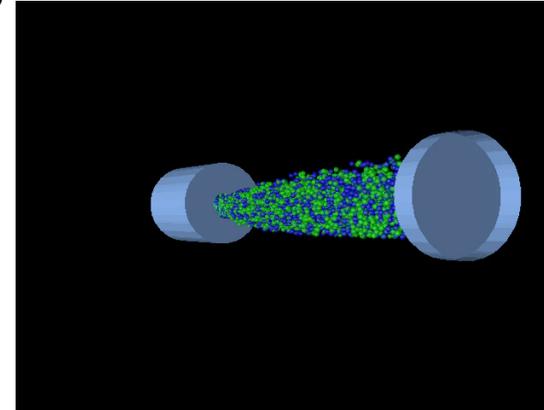
Identification and Significance of Innovation

Identification:

- Kinetic molecular dynamic modeling allows for the lifetime prediction of Hall thrusters.

Significance:

- Hall thruster industry needs an accurate lifetime prediction model.
- Model can provide the reliable lifetime prediction of Hall thrusters with a fast and in-expensive way.



The proposed innovation uses a particle method with a molecular dynamic method to simulate the Hall thruster wall erosion.

Technical Objectives

Demonstrate the feasibility of channel plasma simulation using a kinetic model.

Demonstrate the ability of molecular dynamic modeling of erosion process.

Work Plan

Task 1: Demonstrate 2D thruster Channel plasma simulation using VORPAL.

Task 2: Adapt a MD model in VORPAL to the thruster's specific material.

Task 3: Demonstrate a particle impact emission of surface material.

Task 4: Demonstrate the basic erosion process.

Task 5: Write a final report.

NASA Applications

- NASA focuses on developing of Hall thrusters with increased specific impulse and lifetime.
- Lifetime prediction of Hall thrusters by NASA researchers is critical.

Non-NASA Applications

- Aerospace industry, with engineers and researchers developing Hall thrusters and Hall thruster models
- Material coating industry, with engineers for fabrication of hard coatings.

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