1 Report

by Gullik Vetvik Killie, Add yourself

Abstract

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1.1 Introduction

- State of the art
- Why are we doing this
- What is being done
- Aims of report/study (want to see if)

We are using something to prove something!!!

1.2 Theory

1.3 Numerical Methods

- Short PiC (EMSES) explanation
- Experimental set up
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1.4 Results

1.4.1 Induced electric current

The plasma is flowing in in relation to the coordinate system in the simulations. Due to this an induced electrical field, ε, will appear. To analyze the potential we want to

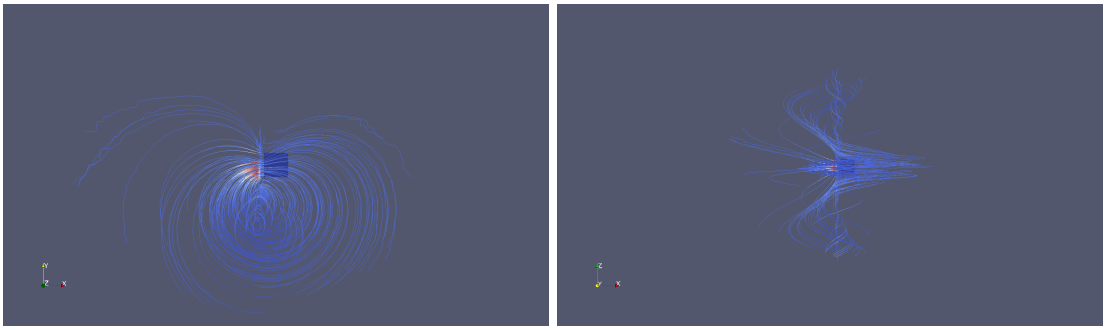

Figure 1.1: The trajectories of the electrons emmited by the photoelectric effect in simulation 6. The possible paths of the photoemmited electrons coincide with the volume occupied by the langmuir probes. The photoemmited electrons are strongly affected by the magnetic field $\vec{B}$, and follows a gyrating path guided by $\vec{B}$. The photoemmited electrons are in all the studied cases emmited from the spacecraft in $-x$ direction, and the paths are similar. The langmuir probes are situated 10cm to each side of the spacecraft along the $x-$direction. (NOTE, should have axis labels, and domain length.)

correct for this potential field. The induced electrical field will neutralize the Lorentz force. Combined with the electrostatic approximation we can obtain the ε

$$\vec{\varepsilon} = \vec{v_D} \times \vec{B} \tag{1.1}$$

$$\int E dx = -\phi \tag{1.2}$$

$$\phi = -\int \vec{v}_d \times \vec{B} \approx -\int (41600\text{m/s} \cdot 50E - 6\text{T})\, dx \tag{1.3}$$

$$\phi = 2.08\text{x} \tag{1.4}$$

1.4.2 Paths of the photoemmited electrons

The electrons emmited from the spacecraft due to the photoelectric effect, have a kinetic energy corresponding to a Maxwellian distribution with a temperature of $T_{ph} = 3.8481 \cdot 10^4$K. Figure **??** illustrates the trajectories of the emmited electrons in simulation 6. As the probes are situated 10cm to the sides of the spacecraft on the $x-$axis, the probes may be hit by the photo-emmited electrons. In the following section, **??**, we show the number of electrons hitting the probes.

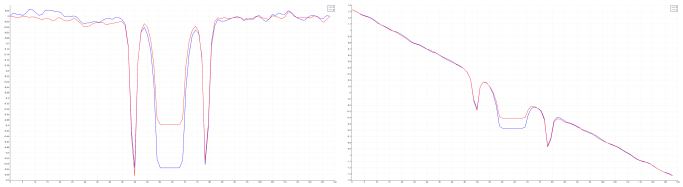

Figure 1.2: Potential of spacecraft and surroundings with P-E and without P-E. Figure on the left displays difference between case 1 and 4. Middle figure displays difference between case 2 and 5. Rightmost figure displays difference between case 3 and 6.

1.4.3 Potential difference with P-E and no P-E

1.5 Discussion

1.6 Conclusions

- Proposal for further studies (Probably see if photoemmision is relevant in tenous plasma (MEO CASE, magnetospheric tail lobes))