

## PIC simulations on magnetic perturbation around the Solar Probe Plus spacecraft

FUNAKI, Yuji<sup>1\*</sup> ; KIKURA, Keisuke<sup>1</sup> ; MIYAKE, Yohei<sup>1</sup> ; USUI, Hideyuki<sup>1</sup>

<sup>1</sup>Graduate School of System Informatics, Kobe University

For future space exploration, it is necessary to predict the nature of spacecraft-plasma interactions in extreme plasma environmental conditions. As one of such activities, we study on the physics of spacecraft-plasma interactions in the near-Sun environment. The spacecraft environment immersed in the solar corona is characterized by the small Debye length due to its high density (7000 /cc) and a large photo-/secondary electron emission current emitted from the spacecraft surfaces, which lead to much different nature of spacecraft-plasma interactions from that in the near-Earth environment. Consequently, the spacecraft charges negatively near the Sun unlike usual photo-emitting spacecraft in the near-Earth environment. In the present study, we reproduce the plasma environment around the Solar Probe Plus satellite planned by NASA by means of numerical simulations based on the Particle-in-cell method. We report recent research progress on near-spacecraft magnetic perturbations, which is generated by a complex current closure around the spacecraft.

Keywords: spacecraft-plasma interaction, solar coronal plasma, spacecraft charging, photoelectron emission, magnetic perturbation, PIC simulation