

## Study on electromagnetic environment at plasma sheath region in space

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We studied the electromagnetic environment of the sheath region around a body immersed in a plasma by performing EM-PIC (Particle-In-Cell) simulations. We pay our attention to the sheath waves which propagate along the surface. In simulations, we could confirm that the sheath waves are localized in the sheath region at the frequencies lower than those of normal waves observed in a uniform plasma.

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On the assumption that the sheath region is vacuum formed between the background plasma and the body, previous theoretical studies

revealed new modes of electromagnetic waves

called sheath waves which propagate along the body surface.

To study the sheath waves in more realistic model, we performed two-dimensional PIC simulations in which a conducting body is immersed in plasmas. It is shown that an ion sheath is created around the body due to the plasma kinetic effects. By performing Fourier transformation of the electromagnetic components obtained in the simulations, we studied the properties of the sheath waves such as the dispersion relations and the spatial profiles. As shown in the theory, we could confirm that the sheath waves are localized in the sheath region at the frequencies lower than those of normal waves observed in a uniform plasma. In simulations, difference from the theory is found in the wave dispersion because the electron density gradually changes at the boundary between the background and the sheath plasma. We will report the details in the presentation.