HTPD 2018

Contribution ID : **369**　　　　　　　　　　　　　　　　Type : **not specified**

2.44 Coherence imaging system for 2D distribution of ion temperature and flow velocity in laboratory magnetosphere

Monday, 16 April 2018 10:46 (120)

Coherence imaging (CI) system has been developed to investigate the mechanism of the high-beta plasma formation in a laboratory magnetosphere and plasma particle transport that creates self-organization. The CI system is possible to measure 2D profile of ion temperature and flow velocity in RT-1 magnetospheric plasmas. The CI system utilizes the optical interference by a birefringent crystal instead of the dispersion by a grating. A CMOS image sensor captures an interferogram of He+ line (468 nm). Performing a fast Fourier transform on the interferogram extracts the intensity, the contrast, and the phase shift at each point, we can introduce the ion temperature and flow velocity from the quantities of the fringe contrast and phase with an instrumental phase, respectively. We successfully observed the 2D distribution of ion temperature in the magnetospheric plasma.

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Session Classification : Session #2, Monday Morning Poster Session