

R008-18

Zoom meeting D : 11/4 PM1 (13:45-15:30)

13:45~14:00

Development of a versatile particle-in-cell simulation code for plasma astrophysics

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Particle-in-cell (PIC) simulations have been used for understanding particle accelerations, particle transport, and magnetic field generation in space and astrophysical phenomena. Using massively parallel supercomputer systems with a parallelized PIC code is a powerful way to elucidate such nonlinear phenomena. We have developed a public PIC code, pCANS (<http://www.astro.phys.s.chiba-u.ac.jp/pcans/>), for promoting the PIC simulation study in astrophysics as well as in the space plasma physics. pCANS has been used by graduate students and early-career researchers (e.g., Tomita and Ohira, 2019).

A more sophisticated PIC code is necessary for using state-of-the-arts supercomputer systems, such as Fugaku, for efficient computations and parallelization. In this regard, we have used an optimized, hybrid-parallelized code for understanding plasma dynamics at large-scale systems (e.g., Matsumoto et al., 2017; Takamoto et al., 2019,2020; Iwamoto et al., 2019, 2020). We recently started a new project for making this code public for general purposes in computational astrophysics. We have re-organized the code to adapt to different supercomputer systems and data I/O procedures. We have also preconfigured physical problems, such as collision-less shocks and Weibel instability, with proper boundary conditions as a quick start. In this presentation, we report the overview of the code and the current status of the development.