

Wave particle correlator simulation via 1D electromagnetic particle code

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In this study, we simulate the wave particle correlator (WPC) in 1D electromagnetic particle code (KEMPO) and estimate the observation results. As satellite observation point, we set the fixed position (wpc-position) in x-axis and we calculate the correlations between electric field (E) and electron particle velocity (v) passed through at wpc-position. From one-point observation and correlation calculation, we need to estimate the observation shows only the 'in-situ' phenomena or indicates global fluctuations in surrounding space plasmas.

In our test simulation, correlations calculated as E times v in wpc-position shows the good relations with global fluctuations in simulation region. We also calculate the correlations between magnetic field (B) and particles as rotation (B and v). It is also indicates the good relations between correlation and total energy change. In phase correlations between E (B) and v, we also find the specific phase bunching will occur when energy growth of E (B). We will discuss the detail results.

From KEMPO results, we convert the simulation data to fixed point data because of FPGA (Field Programmable Gate Array) simulation developed by our team. Though it is now developing stage, we will be able to discuss the time resolution and the data precision by WPC real observation near future.