AOGS 2006

Preliminary Test Results of Digital Wave Particle Correlator (DWPC)

YOSHIKATSU UEDA[1], HIROTSUGU KOJIMA[1], YOSHIFUMI SAITO[2], HIROSHI MATSUMOTO[1]

[1] *Research Institute for Sustainable Humanosphere, Kyoto University, Japan*

[2] *The Institute of Space and Astronautical Science (ISAS)/ Japan Aerospace Exploration Agency(JAXA), Japan*

For a practical application of a plasma wave instrument, a directmeasurement system of wave-particle interactions is one of the importantsystem to the space science mission. Electron bunching generates waveinteractions and in the previous spacecrafts and rockets, an observa-tiontarget for conventional wave particle correlator is a packet-likelangmuir wave generated in the polar aurora or in the solar wind. Thisinstrument can observe wave-particle interactions by calculation of thecross correlation functions between obtained waveforms and detectedpar-ticles onboard. In Japan, we have never developed or flown a direct measuring system forwave particle interaction before. We firstly designed and developed aDigital Wave ParticleCorrelator (DWPC) system. Our designed system is assembled in one FPGA(Field Programmable Gate Array) IC. For a new electron instrument in thedevelopment stage, FPGA is installed in many latest rocket andspacecraft to combine multi-channel, multi-frequency range array ofcorrela-tors with technical improvements. We realized 3-channel ofvariable waveform filter and data synchronization with waveform andparticle in the DWPC system. In FPGA, our algorithm controlswaveform data, particle data, and magnetic field data.