Digital Data Processing Module in the Low Frequency Analyzer System (LFAS) for the SS520-3 Rocket Experiment

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We introduce a digital data processing module for low frequency analyzer system (LFAS) on the "SS-520-3" rocket. The main objective of the SS520-3 rocket experiment is to identify ion acceleration and heating mechanism in the polar cusp region. The LFAS is equipped with two type of receivers; EFD (electric field) and WFC (waveform capture). The EFD measures electric wave field in the frequency range from DC to 400 Hz and the data will be sent by analogue telemetry, while WFC covers electric field measurements in the VLF range below 10 kHz and generate digital data which consist of one channel of spectrum and two channels of waveform. In order to achieve real-time data processing of the WFC receiver on the rocket, we plan to develop digital data processing modules on FPGA. The digital modules consist of three FFT modules with cascaded decimation filters for spectrum analyzers and a lossy data compression module for waveform data for the purpose of data reduction. We have already developed a general-purpose FPGA board for evaluation of various kinds of signal processing [1]. We can integrate our own signal processing module on it without any complicated wiring work for the peripheral circuits and evaluate the performance of our proposed module. In the presentation, we report the current design of these data processing modules.
[1] Y. Kasahara, H. Matsui, and Y. Goto, Abstract of JPGU Meeting 2015, PCG31-19.

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