

A-RGG development for 10 kHz Laser Ranging of Daedeok station.

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Abstract: Korea Astronomy and Space Science institute (KASI) has developed the range gate generator, called A-RGG, for 10 kHz laser ranging of Daedeok station. The A-RGG can generate the range gate with maximum speed of 16 kHz using Lagrange interpolator implemented in the FPGA H/W. The FIFO size is 56x2048 bit for the storage of event epochs from start and stop signal detectors. It can be synchronized with a GPS timing device through the IRIG-B input port. It has H/W delay chip(DS1023S-50) to fulfill the 0.5 ns resolution, and two lookup tables with 64x256 bit size to switch laser ranging operation quickly between two adjacent satellites. Two functions, time bias and range shift, are implemented for satellites with inaccurate orbit ephemeris. It has also collision avoidance function based on epochs of laser fire commands instead of laser fire shifting method. There are three output ports to select RGG (Range Gate Generation) or Fire functions whose delay values can be programmable. In addition, it has input and output delay registers to compensate the cable delay for more accurate RGG. The A-RGG provides the simulation mode to check the operation of internal Lagrange interpolator. The operator can control all A-RGG functions and diagnose the internal operation status from the computer through RS-232 serial communication. In addition it has a display panel in the front of the A-RGG to monitor its status.