

## **Stimulus generation technique for code simulation of FPGA based gamma spectroscopy system**

### **ABSTRACT**

The aim of this study is to develop a software that can systematically generate stimulus required for code simulation (functional and timing) of new digital processors in gamma spectroscopy system. Software must be able to produce stimulus that emulate ADC data of charge sensitive amplifier (CSA) output signal. Signal parameters such as pulse shape, amplitude, pulse width and count rate should be adjustable while allowing options such as pulse pile-up and random pulse events. To fulfill this objective, a pulse generator software PulseGEN has been developed. The software GUI is designed to operate in two modes, Single/Pile-Up Mode and Continuous Random Mode. Its ADC module simulates real-time ADC sampling. The output can be saved as input stimulus to test various functions of digital processors such as pulse height measurements, pile-up detection and correction, as well as random pulse detection and measurement that is similar to the actual real-time measurement. PulseGEN results have been compared and verified against commercial charge sensitive amplifier with NaI detector and NIM pulser.

**Keyword:** FPGA simulation; Gamma spectroscopy; Input stimulus; Multichannel analyzer; Test bench