

Novel Peak Detection Algorithms For Pileup Minimization In Gamma Ray Spectroscopy

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Summary

A fast waveform sampling facility has been recently developed and integrated into the VAX-based data acquisition system at the Center for Applied Physical Sciences (CAPS). This study uses the above facility in developing algorithms for digitally determining the basic pulse parameters and tackling the problem of pulse pile-up in Gamma-ray spectroscopy. A number of parameter estimation and digital online peak localisation algorithms are being developed, including a pulse classification technique which uses a simple peak search routine based on the smoothed first derivative method, which gave a percentage error of peak amplitude of less than 1%. The classification technique has the unique feature of cutting down the computation largely by only allowing the event of interest to be executed by a particular algorithm. The set-up was also tested with random signals from a ^{137}Cs test source. Gamma pulses from a $^3\text{Na(Tl)}$ scintillation detector were captured as single and double pulses for the purpose of testing the peak detection algorithms. The pulse classification technique was tested successfully on a TMS320C6000 high performance floating-point processor yielding a reduction of the execution time to 2 msec

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