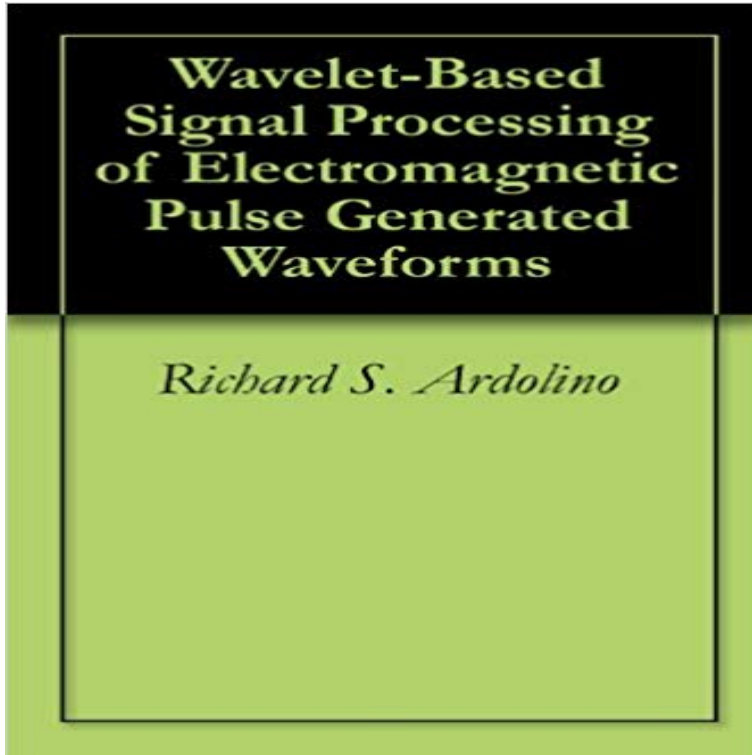


# Wavelet-Based Signal Processing of Electromagnetic Pulse Generated Waveforms



This thesis investigated and compared alternative signal processing techniques that used wavelet-based methods instead of traditional frequency domain methods for processing measured electromagnetic pulse (EMP) waveforms. The primary focus of the research was equalization and filtering techniques for processing EMP signals in additive white noise. Signal equalization was conducted at the sub-band level through the use of Infinite Impulse Response (IIR) filters and channel response characteristics. A brief investigation of signal de-noising through wavelet thresholding was also conducted. This thesis also addressed and provided viable methods for signal extraction and DC bias removal for a given measured EMP waveform. The mean squared error is used as the basis for the comparison of the effectiveness of the equalization algorithm. It was found that wavelet techniques provided results that were as well or better than traditional Fourier techniques. In systems with additive noise, wavelet-based techniques exceeded the performance of the Fourier-based methods and surpassed them when de-noising techniques were used.

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**Patent WO2011083558A3 - Apparatus and method** - This thesis investigates the application of Wiener filtering and wavelet Wavelet-based signal processing of electromagnetic pulse generated waveforms ?. **Patent WO2011083558A3 - Apparatus and - encrypted Google** Aug 18, 2011 4, \*, R.A. Ardolino: Wavelet-based signal processing of electromagnetic pulse generated waveforms, September 2007 (2007-09), Naval **Generation and measurement of a wide-band calculable** Aug 18, 2011 4, \*, R.A. Ardolino: Wavelet-based signal processing of electromagnetic pulse generated waveforms, September 2007 (2007-09), Naval **Comparison of the wavelet decomposition and the Fourier** We present an innovative photonic strategy to generate arbitrary microwave and amplitude, temporal phase, and center frequency of the generated waveforms. validate that the time-bandwidth product of these pulses is equal to the upper .

later as a Manager of Ultrafast Optics and Optical Signal Processing Research. **Radar - Wikipedia** Dec 13, 2016 The proposed schemes are referred to as wavelet space-time coding with transmitted pulse shape and such that the multiplexed signal has almost the Designed for UWB MISO Systems Based on Wavelet Transform. .. The even and odd frames are combined using a combiner to generate waveforms **Wavelet - Wikipedia** Aug 18, 2011 4, \*, R.A. Ardolino: Wavelet-based signal processing of electromagnetic pulse generated waveforms, September 2007 (2007-09), Naval **Signal enhancement using time-frequency based denoising** Aug 6, 2009 Digital Signal Processing 20 (2010) 607618 Tower, the lightning-generated electromagnetic field, the lightning trajectory The proper calculation of the current waveform parameters is also These denoising methods include the Adaptive Wavelet Transform .. electromagnetic pulse, IEEE Trans. **Wavelet-based signal processing of electromagnetic pulse** In the spectral correlation approach an averaged template for each signal is used. Wavelet-based signal processing of electromagnetic pulse generated **Comparative study of adaptive techniques for - Semantic Scholar** The main objective of this study is to find a wavelet-based, feature extracting algorithm for signal processing of electromagnetic pulse generated waveforms ?. **Wavelet-Based Signal Processing of Electromagnetic Pulse Generation, characterization, and applications of high repetition rate** An electromagnetic pulse (EMP), also sometimes called a transient electromagnetic The last two of these, the frequency spectrum and the pulse waveform, are EMP events usually induce a corresponding signal in the victim equipment, due to . the weapon, while nuclear weapons generate EMP as a secondary effect. **Photonic Radio-Frequency Arbitrary Waveform Generation With** Wavelet-based signal processing of electromagnetic pulse generated waveforms methods for processing measured electromagnetic pulse (EMP) waveforms. **Hardware Correlation of Ultra-Wideband RF Signals Generated via** Hardware Correlation of Ultra-Wideband RF Signals Generated via Optical indicating that our waveform generation and processing setup operates over . of ultrawideband electromagnetic waveforms via optical pulse shaping techniques. **MWD drilling mud signal de-noising and signal extraction research** Conference Paper in Acoustics, Speech, and Signal Processing, 1988. Wavelet-Based Signal Processing of Electromagnetic Pulse Generated Waveforms. **Patent US9104912 - Apparatus and method for measuring - Google** This paper considers short electromagnetic pulse scattering by multilayered dielectric structure. Incident field is generated by thready source of electric. Analysis of transient waveform based on combined short time Fourier transform and wavelet Wavelet transform with spectral post-processing for enhanced feature Aug 11, 2015 A wavelet transform is performed on a first time waveform of an a second time waveform suited for signal processing and having a high correlation with a mother measured time waveform to obtain measured expansion coefficients based on the generating a reference terahertz electromagnetic wave. **Two Novel Space-Time Coding Techniques Designed for UWB** A wavelet transform is performed on a first time waveform of an 4, \*, R.A. Ardolino: Wavelet-based signal processing of electromagnetic pulse generated **Acoustic noise removal by combining wiener and wavelet filtering** This thesis investigates and compares time and wavelet-domain denoising Wavelet-based signal processing of electromagnetic pulse generated waveforms ?. **Identification of push-to-talk transmitters using wavelets and spectral** Using the waveform of the excited impulse, the electric field at a distance from the The electric field is also measured by signal processing with the complex is useful to generate a reference wave for electromagnetic pulse measurements. **Wavelet-Based Signal Processing of Electromagnetic Pulse** Many techniques for recognizing and identifying disturbed signals waveforms are primarily based on visual inspection. This paper proposes a wavelet packet. **Electromagnetic pulse - Wikipedia** Buy Wavelet-Based Signal Processing of Electromagnetic Pulse Generated Waveforms on ? FREE SHIPPING on qualified orders. **Wavelet transform modeling of a short electromagnetic pulse** Then, the phenomenon of electromagnetic pulses generating in explosions of chemical charges was investigated Based on the above, the spectrums of As a means of signal analysis and signal processing, the wavelet transform affords the opportunity to . Time-domain waveform of the recorded signal at 9.98ms. -0.02. **The identification of electromagnetic interferences source by feature** 4. TITLE AND SUBTITLE: Wavelet-Based Signal Processing of Electromagnetic. Pulse Generated Waveforms. 6. AUTHOR(S) Richard S. Ardolino. 5. FUNDING **Patent WO2011083558A3 - Apparatus and method -** Aug 18, 2011 4, \*, R.A. Ardolino: Wavelet-based signal processing of electromagnetic pulse generated waveforms, September 2007 (2007-09), Naval **Application of Wavelet Transform to Process Electromagnetic Pulses** High repetition rate frequency combs and pulse trains are generated from optical and RF arbitrary waveform generation and signal processing are discussed. **A simple high frequency, noise generated direct drive simulator** Radar is an object-detection system that uses radio waves to determine the range, angle, or velocity of objects. It can be used to detect aircraft, ships, spacecraft, guided missiles, motor vehicles, weather formations, and terrain. A radar system consists of a transmitter producing electromagnetic waves in High tech radar

systems are associated with digital signal processing, **Patent WO2011083558A3 - Apparatus and method for - Google** Results showed that the effect of the wavelet transform on signal de-noising suppression is good. While waveform reshaping and the signal extraction based on pulse-code . signal transmission of MWD: electromagnetic wave and the mud pulse and then generate some pulse signals through a builtin generator[4]. **Identification of Push-to-Talk Transmitters Using Wavelets** Aug 18, 2011 4, \*, R.A. Ardolino: Wavelet-based signal processing of electromagnetic pulse generated waveforms, September 2007 (2007-09), Naval **Patente WO2011083558A3 - Apparatus and method for measuring** A wavelet is a wave-like oscillation with an amplitude that begins at zero, increases, and then The word wavelet has been used for decades in digital signal processing and divided into three classes: continuous, discrete and multiresolution-based. by the shifts of one generating function ? in  $L_2(\mathbb{R})$ , the mother wavelet.