

UWB Channel Estimation Using an Efficient Sub-Nyquist Sampling Scheme

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Abstract : Recently, low-complexity sub-Nyquist sampling schemes based on the Finite Rate of Innovation (FRI) theory have been introduced to sample parametric signals at minimum rates. The multichannel modulating waveforms (MCMW) is such an efficient scheme, where the received signal is mixed with an appropriate set of arbitrary waveforms, integrated and sampled at rates far below the Nyquist rate. In this paper, the MCMW scheme is adapted to the special case of ultra wideband (UWB) channel estimation, characterized by dense multipaths. First, an appropriate structure, which accounts for the bandpass spectrum feature of UWB signals, is defined. Then, a novel approach to decrease the number of processing channels and reduce the complexity of this sampling scheme is presented. Finally, the proposed concepts are validated by simulation results, obtained with real filters, in the framework of a coherent Rake receiver.

Keywords : coherent rake receiver, finite rate of innovation, sub-nyquist sampling, ultra wideband

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