

Blind Channel Estimation for Frequency Hopping System Using Subspace Based Method

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Abstract : Subspace channel estimation methods have been studied widely. It depends on subspace decomposition of the covariance matrix to separate signal subspace from noise subspace. The decomposition normally is done by either Eigenvalue Decomposition (EVD) or Singular Value Decomposition (SVD) of the Auto-Correlation matrix (ACM). However, the subspace decomposition process is computationally expensive. In this paper, the multipath channel estimation problem for a Slow Frequency Hopping (SFH) system using noise space based method is considered. An efficient method to estimate multipath the time delays basically is proposed, by applying Multiple Signal Classification (MUSIC) algorithm which used the null space extracted by the Rank Revealing LU factorization (RRLU). The RRLU provides accurate information about the rank and the numerical null space which make it a valuable tool in numerical linear algebra. The proposed novel method decreases the computational complexity approximately to the half compared with RRQR methods keeping the same performance. Computer simulations are also included to demonstrate the effectiveness of the proposed scheme.

Keywords : frequency hopping, channel model, time delay estimation, RRLU, RRQR, MUSIC, LS-ESPRIT

Conference Title : ICECCE 2015 : International Conference on Electronics, Computer and Communication Engineering

Conference Location : Istanbul, Türkiye

Conference Dates : April 21-22, 2015