INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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SHORT ABSTRACT

Blind modulation classification finds extensive applications in military and civilian areas. There is a need for improvement of the existing modulation classification methods in adverse channel conditions, which is the motivation for this research. The likelihood based method is adopted due to the availability of the optimum solution. In a non data aided scenario, blind parameter estimation becomes the essential pre-processing stage for the likelihood based modulation classification. In this research, the performance of the likelihood-based modulation classification is explored with the symbol rate, the signal gain, the noise power and the phase offset as the unknown parameters with primary focus on developing new parameter estimation algorithms in deteriorated signal conditions. Starting with the problem of timing recovery, a robust estimator for the symbol rate is proposed using the second order cyclostationarity of the digitally modulated signals. The new method is robust against fading and pulse-shape uncertainty. The problem of gain uncertainty is addressed next, using estimation of the constellation clusters. To improve the classification performance further in low SNR, flat fading and impulse noise, a new approach for the estimation of the channel gain, the phase offset and the noise power is proposed by employing the expectation maximization algorithm. Finally, to resolve the issue of the inter symbol interference in frequency selective fading, we propose a method for blind channel equalization for the non data aided modulation classification scenario. By using the proposed blind channel equalization method, a significant improvement is achieved in the likelihood based MC performance. A brief on the practical implementation of the proposed MC algorithms are presented with performance data from the field deployment.