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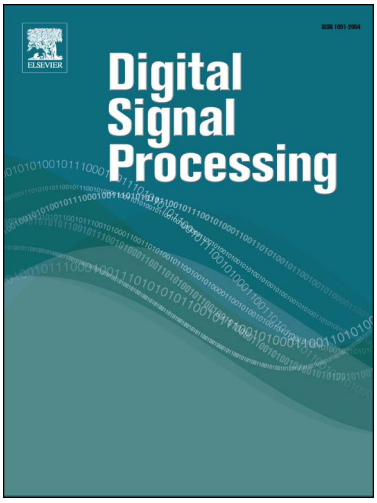

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Robust Adaptive Algorithms for Underwater Acoustic Channel Estimation and Their Performance Analysis

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Abstract

We introduce a novel family of adaptive robust channel estimators for highly challenging underwater acoustic (UWA) channels. Since the underwater environment is highly non-stationary and subjected to impulsive noise, we use adaptive filtering techniques based on minimization of a logarithmic cost function, which results in a better trade-off between the convergence rate and the steady state performance of the algorithm. To improve the convergence performance of the conventional first and second order linear estimation methods while mitigating the stability issues related to impulsive noise, we intrinsically combine different norms of the error in the cost function using a logarithmic term. Hence, we achieve a comparable convergence rate to the faster algorithms, while significantly enhancing the stability against impulsive noise in such an adverse communication medium. Furthermore, we provide a thorough analysis for the tracking and steady-state performances of our proposed methods in the presence of impulsive noise. In our analysis, we not only consider the impulsive noise, but also take into account the frequency and phase offsets commonly experienced in real life experiments. We demonstrate the performance

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