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Continuous pilot based adaptive estimation for IDMA systems on underwater acoustic channels

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Abstract:

Two adaptive receivers for jointly detecting active users in an interleave division multiple access (IDMA) system are considered for highly dispersive underwater acoustic channels (UACs) using a continuous pilot approach. A direct adaptive interference cancellation (IC) IDMA receiver is proposed and compared with the standard Rake-IDMA receiver that performs adaptive semi-blind channel estimation developed by the authors. Both iterative decoding receivers incorporate a phase locked loop (PLL) and are optimized based on the minimum mean square error (MMSE) criterion. The theoretical basis of both receivers is presented along with experimental results obtained by processing data from actual underwater communication experiments. The transmission results of 3 active users at a data rate of 441.3 b/s per user within 4 kHz bandwidth demonstrate that the IC-IDMA receiver has better performance and significantly mitigates the bit errors associated with Rake-based IDMA receiver.

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