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Turbo multiuser detectors for IDMA-based underwater communications

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Abstract:

In this paper, turbo multiuser detectors in Interleave Division Multiple Access (IDMA) based systems are considered for short range underwater acoustic channels (UACs). In such long reverberant channels that demand high computational complexity, turbo detectors based on minimum mean square error (MMSE) criterion are an attractive solution to achieve a good balance between performance and complexity. Two different synchronous IDMA structures are studied and applied to signals acquired during sea trials in the North Sea; firstly, a channel estimation (CE) based IDMA with Rake reception, and secondly, an adaptive interference canceller (IC-IDMA). Both schemes include phase tracking, channel coding and are based on a chip-rate equalization and detection, which are fed in by a composite multiuser signal of the users' feedback soft information. Experimental results of three different channel ranges demonstrate that the direct adaptive receiver has better performance and additionally mitigates the errors associated with the CE based IDMA receiver while maintaining lower complexity.

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