

Performance of Adaptive Channel Equalization Techniques: DFEs, Time-Reversal, and Connections to Adaptive Array Processing

Dr. James Preisig

Associate Scientist, Woods Hole Oceanographic Institution

jpreisig@whoi.edu 508-289-2736

Abstract: Several techniques for achieving coherent communications through underwater acoustic channels have been demonstrated in the recent literature. Among these include channel estimate based decision feedback equalization and active and passive time-reversal. However, no work has been appeared to date comparing the performance of these systems, either analytically or on common data. This paper will present a unified analysis of the performance of these techniques. Closed form expressions for the performance characteristics of each technique are presented. These expressions closely resemble those from the adaptive array processing literature for characterizing the performance of processors in the presence of environmental mismatch. The expressions lead to insights into the factors that impact equalizer performance. The performance of DFEs and the passive time-reversal technique is also compared using experimental data.