

## 电子技术

### 水声信道快速收敛自适应均衡算法

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#### 摘要:

从提高自适应均衡算法水声信号收敛性能的角度出发, 提出了一种新的快速收敛水声信道自适应均衡算法。该算法将改进的归一化均方误差算法和判决反馈均衡器结构有机结合, 在不增加计算量的前提下, 很好地实现了不同水声信道的自适应均衡, 易于算法的硬件实现。仿真结果表明, 该算法计算量同归一化最小均方(normalized least mean square, NLMS)误差算法的计算量相当, 但在稳态误差和收敛速度上有很大优势; 收敛性能与自适应调整最小二乘回归[CD\*2]判决反馈均衡器(variable tap-length decision feed-back equalizer based on recursive least square, RLS-DFE)算法接近, 却克服了RLS-DFE算法计算量大, 不利于硬件实现的实际问题。提出的算法为水声通信提供了一种性能优良的可实现方法, 具有较高的应用价值。

关键词: 水声通信 归一化 变步长 收敛速度 判决反馈

### Fast convergence adaptive equalization algorithm for underwater acoustic channels

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#### Abstract:

A new fast adaptive equalization algorithm is proposed to improve the convergence ability in equalizing underwater acoustic signal. The algorithm, which combines the modified normalized square error algorithm with decision feedback equalizer structure, realizes the adaptive equalization of various underwater acoustic channels and is prone to hardware realization on the premise of non-increasing computational quantity. The simulation results show that computational quantity of the proposed algorithm is comparable to normalized least square error (NLMS), but mean square error (MSE) performance and convergence rate are superior to NLMS on a large extend; the convergence ability of the proposed algorithm is close to variable tap-length decision feed-back equalizer based on recursive least square (RLS DFE) algorithm, but it overcomes the fact problem of great computational quantity and improbable hardware realization which existed in RLS DFE algorithm. This algorithm is a realizable method with good performance in underwater acoustic communication.

Keywords: underwater acoustic communication normalized variable step-size convergence rate decision feedback

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