

短文与研究通讯

基于连续块处理的改进LMS算法研究

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摘要:

在基于连续数据块处理的硬件系统中, 若干块数据通过LMS迭代算法处理后得到多组权值矢量。若各组权值矢量波动过大, 系统性能将会急剧下降。针对此问题, 本文提出了一种基于连续块处理的改进LMS算法, 该方法首先利用LMS算法对一块数据进行迭代计算, 得到此块数据对应的更新权矢量, 将该权矢量乘以一个复系数使其向上一块数据对应计算所得的权矢量进行归一(幅度和相位上的归一), 然后将归一化处理后的权矢量作为下一块数据迭代计算的初值。经过上述处理后, 权值收敛速度得到了提高, 同时减小了数据块间更新权矢量的波动, 进而减小系统其他相关参数的波动, 提高硬件系统稳定性。最后仿真实验结果验证了本文算法的有效性和正确性。

关键词: 最小均方算法 权值波动 归一化 稳定性

Study of Improved LMS Algorithm Based on the Continuous Block Processing

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Abstract:

In the hardware system based on the continuous data block processing, several blocks of data are processed by the Least Mean Square (LMS) algorithm to obtain multiple weight vectors. The hardware system performance will get bad sharply if these weight vectors undulate greatly. In this paper, an improved LMS algorithm based on the continuous block processing is proposed to solve the problem. Firstly an updated weight vector is calculated by LMS algorithm for one block of data. Then, this weight vector is multiplied by a complex coefficient to normalize itself to the updated weight vector corresponding to the last block of data, which realizes the normalization of the amplitude and phase. Then the normalized weight vector is used as the initial weight vector in the next iteration calculation for the next data block. After the above processing, the fluctuation of the updated weight vectors among the data blocks is decreased so that the related parameters of the system change steadily and the system stabilization is enhanced. Meanwhile the convergence speed is improved. The effectiveness and correctness of the proposed method have been verified by computer simulations at last.

Keywords: Least Mean Square (LMS) algorithm weight fluctuation normalize stabilization

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