

论文

二维线性相位FIR数字滤波器的优化设计

王小华^{***}, 何怡刚^{**}, 彭玉楼^{***}

^{*}长沙理工大学电气与信息工程学院 长沙 410077; ^{**}湖南大学电气与信息工程学院 长沙 410082; ^{***}长沙理工大学计算机与通信工程学院 长沙 410077

收稿日期 2004-6-1 修回日期 2004-11-17 网络版发布日期 2007-12-27 接受日期

摘要

该文提出了一种用神经网络算法来设计二维线性相位数字滤波器的新方法。通过分析二维FIR线性相位滤波器的幅频响应特性,建立了神经网络算法。根据给定的幅频响应指标,按该算法可获得滤波器系数。为保证该算法的稳定性,提出并证明了该算法的收敛定理。文中给出了圆对称和矩形对称二维低通线性相位FIR数字滤波器优化设计实例。计算机仿真结果表明由该方法设计的二维数字滤波器,通带和阻带范围波动小,所需计算量非常少,稳定性强,因而是一种优异的设计方法。

关键词 [二维数字滤波器](#) [线性相位](#) [神经网络](#) [收敛定理](#) [优化设计](#)

分类号 [TN911.72](#)

Optimum Design of 2-D Linear-Phase FIR Digital Filters

Wang Xiao-hua^{***}, He Yi-gang^{**}, Peng Yu-lou^{***}

^{*}Electrical and Infomational Engineering College, Changsha University of Science & Technology, Changsha 410077, China; ^{**}Electrical and Infomational Engineering College, Hunan University, Changsha 410082, China; ^{***}Computer and Communication College, Changsha University of Sience & Tchnology, Changsha 410077,China

Abstract

This paper provides a new design approach based on a Neural Networks Algorithm (NNA). According to the amplitude-frequency response characteristics of 2-D FIR linear-phase filters ,the NNA is established .Using the NNA,the designed filter coefficients can be obtained from the specified amplitude-frequency responses.To ensure stability of the NNA, the convergence theorem of the NNA is presented and proved. Two examples including circularly-symmetric and quadrately-symmetric 2-D lowpass linear-phase FIR filtrs are also given to illustrate the effectiveness of the NNA-based design approach,and the results show that the ripple is considerably small in passband and in stopband,and the NNA-based method is of strong stability and requires significantly little amount of computations.Therefore,the optimal design approach is effective and excellent in the design field of 2-D linear phase FIR digital filters.

Key words [2-D digital filters](#) [Linear-phase](#) [Neural network](#) [Convergence theorem](#) [Optimal design](#)

DOI :

通讯作者

作者个人主页 王小华^{***}; 何怡刚^{**}; 彭玉楼^{***}

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