Abstract

The everyday broadening field of signal processing has digital filters to play a major role. Linear phase FIR filters are used in vast number of applications due to their nature of phase linearity as well as frequency stability. The traditional non-optimization methods available for filter design suffer from the problem of need for analog to digital conversion and also the inefficient control of frequency response. The conventional gradient based optimization methods are unable to solve non-differential functions and converges to local optimum solution. Thus this paper presents the evolutionary optimization technique of Particle Swarm Optimization (PSO) for the design of linear phase digital low pass (LP) FIR filter. Given the specifications of desired filter to be realized, PSO algorithm results in an optimal coefficient set for linear phase FIR filter approximating the ideal specifications. In this paper PSO algorithm is used with constriction factor approach to solve the multimodal, highly non-linear filter design problem. This method has the property of parameter independence and thus ensuring convergence while fully exploring the solution space. The velocity and position updating rules of original PSO algorithm is used for the design of low pass FIR filter of order 20. The extensive simulation results obtained from the proposed method shows superiority of the algorithm.
Design of Linear Phase Low Pass FIR Filter using Particle Swarm Optimization Algorithm

References

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Index Terms
Computer Science
Algorithms

Keywords
Linear phase low pass (LP) filter  PSO algorithm  Passband  Stopband.