WLS IIR digital filter design using SOCP

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Abstract

In this paper, we propose an iterative method for designing IIR digital filters in the weighted least squares (WLS) sense. Since the original design problem is essentially nonconvex, it is first relaxed into a second-order cone programming (SOCP) problem. By solving the relaxed problem, the lower bound on the optimal value of the original problem can be obtained. And the corresponding filter coefficients can be chosen as the starting point of the following iterative procedure. At each iteration, a linear inequality constraint is further incorporated to gradually reduce the gap between the original and the relaxed problem. Analyses show that the convergence of the proposed iterative procedure can be definitely guaranteed. Two examples are presented to demonstrate the effectiveness of the proposed method.

References


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