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A HARDWARE ACCELERATOR FOR THE COMPUTATION OF MODIFIED DISCRETE SINE TRANSFORM

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Abstract: This work presents an efficient hardware implementation of a hardware accelerator for the computation of the Modified Discrete Sine transform (MDST) using a new VLSI algorithm based on a appropriate reformulation of the MDST algorithm using some auxiliary input and output sequences. The obtained hardware implementation is using a low complexity implementation based on only adders/subtracters and has a reduced critical path that can be exploited to obtain a significant reduction of the power consumption.

Keywords: Discrete transforms, Modified Discrete Sine transform, VLSI algorithms, VLSI architectures, data compression
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1. Introduction

The Modified Discrete Cosine Transform (MDCT), the Modified Discrete Sine Transform (MDST), and their inverse transforms (IMDCT and IMDST) are used in subband analysis/synthesis approaches [1],[2] that have been used to construct filter-banks used in Dolby Enhanced AC3 (E-AC-3) audio coding standard [3] and some other audio coding standards [4]-[6].

MDCT and MDST are computational intensive as also DCT and DST and efficient software and hardware algorithms and implementations are required for a real-time implementation.

There are several efficient software implementations [7]-[10] and some hardware implementations [11]-[20] but all of these hardware solutions are based on recursive algorithms.

Although it is possible to establish a quite simple relation between the MDCT and the MDST, that allows us to concentrate more on the investigation of a fast MDCT algorithm and implementations, the MDST computation through the MDCT algorithm still takes extra executing time, although both of the MDCT and MDST hardware accelerators could be unified. This indicates that the MDCT and MDST coefficients cannot be simultaneously computed. Since these equations are all dependent, how to efficiently compute the MDCT and MDST coefficients is still a challenging problem.

In this paper we propose a direct method to efficiently implement the MDST algorithm using some auxiliary input and output sequences. Thus, we can

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