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**Multiplierless lifting-based fast X transforms derived from fast Hartley transform factorization.** (English) [Zbl 1450.94023](#)

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Summary: This paper presents  $M$ -channel ( $M = 2^N$ ,  $N \in \mathbb{N}$ ,  $N \geq 1$ ) multiplierless lifting-based (ML-) fast X transforms (FXTs), where X = F (Fourier), C (cosine), S (sine), and H (Hartley), i.e., FFT, FCT, FST, and FHT, derived from FHT factorization as way of lowering the cost of signal (image) processing. The basic forms of ML-FXTs are described. Then, they are customized for efficient image processing. The customized ML-FFT has a real-valued calculation followed by a complex-valued one. The ML-FCT customization for a block size of 8, which is a typical size for image coding, further reduces computational costs. We produce two customized ML-FCTs for lossy and lossless image coding. Numerical simulations show that ML-FFT and ML-FCTs perform comparably to the conventional methods in spite of having fewer operations.

**MSC:**

[94A12](#) Signal theory (characterization, reconstruction, filtering, etc.)

[65T50](#) Numerical methods for discrete and fast Fourier transforms

**Software:**

[binDCT](#); [SIPI Image Database](#)

**Full Text:** [DOI](#)

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