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Bin Han* (bhan@math.ualberta.ca), Department of Math. and Stat. Sciences, University of Alberta, Edmonton, Alberta T6G 2G1, Canada. *Symmetric orthonormal complex wavelets with arbitrarily high linear-phase moments.* Preliminary report.

We study symmetric orthonormal dyadic complex wavelets such that the orthonormal refinable functions have high linear-phase moments and the wavelets have high vanishing moments. Such wavelets lead to real-valued symmetric tight wavelet frames with desirable moment properties, and are related to real-valued coiflets which are of interest in numerical algorithms. For $m \in \mathbb{N}$, using only Riesz lemma, we obtain a symmetric orthogonal mask $\hat{a}(\xi) = \sum_{k=2^{-2m}}^{2^{m-1}} h_k e^{-ik\xi}$ with $h_{1-k} = h_k \in \mathbb{C}$ such that \hat{a} has m sum rules and m linear-phase moments: $\hat{a}(\xi) = e^{-i\xi/2} + O(|\xi|^m)$, $\xi \rightarrow 0$. The associated antisymmetric wavelet ψ has m vanishing moments and the symmetric orthonormal refinable function ϕ has moments $\int_{\mathbb{R}} \phi(x) dx = 1$ and $\int_{\mathbb{R}} (x - 1/2)^j \phi(x) dx = 0$ for all $j = 1, \dots, m - 1$. It is an open problem whether there is a family of real-valued orthonormal wavelets such as coiflets whose masks can have arbitrarily high linear-phase moments. Our results answer this question for the complex wavelet case with symmetry. We also settled an open question on symmetric Daubechies complex orthogonal masks. Examples and construction procedures for symmetric orthogonal masks with high linear-phase moments and sum rules are given. (Received April 16, 2008)