

Title:

**Compactly Supported Tight and Sibling Frames with Maximum Vanishing Moments**

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Abstract:

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The notion of vanishing-moment recovery (VMR) functions is introduced in this paper for the construction of compactly supported tight frames with two generators having the maximum order of vanishing moments as determined by the given refinable function, such as the  $m^{\text{th}}$  order cardinal  $B$ -spline  $N_m$ . The notion of sibling frames is also introduced to achieve additional properties such as symmetry (or anti-symmetry) minimum support, “shift-invariance,” and inter-orthogonality. For  $N_m$ , it turns out that symmetry can be achieved for even  $m$ , and anti-symmetry for odd  $m$ . Again for  $N_m$ , minimum support and “shift-invariance” can be attained by considering the two frame generators with two-scale symbols  $2^{-m}(1-z)^m$  and  $2^{-m}z(1-z)^m$ , and that inter-orthogonality is always achievable, but sometimes at the sacrifice of symmetry.