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MULTIDIMENSIONAL SMOOTHING USING HYPERBOLIC INTERPOLATORY WAVELETS *

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Abstract. We propose the application of hyperbolic interpolatory wavelets for large-scale d-dimensional data fitting. In particular, we show how wavelets can be used as a highly efficient tool for multidimensional smoothing. The grid underlying these wavelets is a sparse grid. The hyperbolic interpolatory wavelet space of level j uses $O(j^{d-1}2^j)$ basis functions and it is shown that under sufficient smoothness an approximation error of order $O\left(\binom{j+d-1}{d-1}2^{-2j}\right)$ can be achieved. The implementation uses the fast wavelet transform and an efficient indexing method to access the wavelet coefficients. A practical example demonstrates the efficiency of the approach.

Key words. sparse grids, predictive modelling, wavelets, smoothing, data mining.

AMS subject classifications. 65C60, 65D10, 65T60.

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