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Wavelet compression of geodetic integral operators.

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For the numerical evaluation of integral operators, both the kernel and the data have to be represented with respect to a system of base functions.
Depending on the choice of the system of base functions, the matrix representaion of the kernel becomes sparse or fully occupied.
For the special case of planar integral formulas with convolution kernel, the optimal choice of base functions is well known:
Trigonometric functions generate a kernel representation by a diagonal matrix.
For integral formulas on the sphere or integral formulas not beeing of convolution type no optimal choice is known.
The paper ist to demonstrate that in those cases wavelets provide a system of base functions, which lead to a very sparse matrix
description of the kernel.
The paper first gives an extension of wavelet analysis and synthesis to the 4D case. Then the evaluation of an intgeral formula
for a wavelet representation of the kernel is given. The results are tested for several kinds of integral formulas and for different wavelet
bases.