

# QUADRATURE OPERATORS AND THE CONSTRUCTION OF HYPERCOMPLEX WAVELETS

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We consider a multidimensional, hypercomplex-valued generalization of the one-dimensional Hilbert transform and the analytic signal, called *quadrature operator*. The concept of quadrature operator generalizes the crucial operator properties of the Hilbert transform. We show that both the partial Hilbert and the Riesz transform, the classical (hyper)complex generalizations of the Hilbert transform, fall into the class of quadrature operators.

We then construct hypercomplex wavelets by combining a quadrature operator  $\mathcal{Q}$  with a real-valued wavelet  $\psi$ . Since not every such combination leads to a reasonable hypercomplex wavelet, we show under which conditions on  $\mathcal{Q}$  and  $\psi$  it does so.