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Nonlinear Functions of Wavelet Expansions – Adaptive Reconstruction and Fast Evaluation

This talk is concerned with the efficient evaluation of nonlinear expressions of wavelet expansions obtained through an adaptive process. In particular, evaluation covers here the computation of inner products of such expressions with wavelets which arise in the context of Galerkin or Petrov Galerkin schemes for the solution of differential equations. The central objective is to develop schemes that facilitate such evaluations at a computational expense exceeding the complexity of the given expansion as little as possible. The analysis of these approximations finally leads to a concrete evaluation scheme which is in a certain sense asymptotically optimal. A central ingredient of the approach is the construction and analysis of certain approximation schemes with good local properties.