A first implementation of a optimal adaptive algorithm for elliptic operator equations.

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The goal of the project we have been working on during this CEMRACS, is to implement the algorithm proposed by Albert Cohen, Wolfgang Dahmen and Ronald De Vore in an incoming paper "Adaptive Wavelet Methods for Elliptic Operator Equations – Convergence Rates".

The key point of this algorithm is the way to apply a quasi-sparse matrix to a sparse vector, based on a decomposition of the vector and the matrix.

We have made a first implementation in C++ of this algorithm and have done some tests for 1D problem.

We want to continue this project in several directions :

- actually the computation of the stiffness matrix of the problem is done on a finest scale, we want to compute only needed coefficients and by this way avoid the problem of choosing a priori a finest scale,
- we also want to optimize the matrix-vector product used in the conjugate gradient algorithm on which the result coefficients set to be computed is known before the computation.
- Then, we have planed to do some tests in 2D.

The continuation of this project is needing, at least, an other meeting of the team.