

Multilevel solvers for hp -FEM discretizations in 3D using hexahedral elements

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In this talk we investigate the discretization of an elliptic boundary value problem in 3D by means of the hp -version of the finite element method using a mesh of hexahedrons. The corresponding linear system is solved by a preconditioned conjugate gradient method. The construction of the preconditioner is based on an inexact additive overlapping Schwarz method which was suggested by Pavarino.

The remaining subproblems are treated by a tensor product based preconditioner. This preconditioner uses a basis transformation into a basis which is stable in L_2 and H^1 . The construction is based on interpretations of the p -FEM mass and stiffness matrix as weighted h -FEM matrices and a simultaneous diagonalization of these matrices using wavelets.

Several numerical examples show the efficiency of the proposed method.

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