INTERPOLATION ERROR ESTIMATES FOR VECTORIAL FINITE ELEMENTS ON GENERAL POLYHEDRAL ANISOTROPIC MESHES

ALEXIS JAWTUSCHENKO AND ARIEL L. LOMBARDI

Abstract. In this talk we consider conforming approximations of $H(\mathrm{div})$ and $H(\mathrm{curl})$ by Raviart-Thomas and Nédélec finite elements, respectively, on anisotropic meshes. We are mainly interested in graded meshes which were proposed to recover the optimal order of convergence when the solution has singularities along edges or on vertices of a polyhedral domain.

We review some known results on anisotropic interpolation error estimates for those finite elements on tetrahedral meshes [1, 2]. In particular we note that we can not obtain anisotropic error estimates for Raviart-Thomas elements on a kind of tetrahedra known as slivers. In this case the error estimates are uniform with respect to the anisotropy of the elements, but they are not of anisotropic type. Unfortunately, the slivers seems to be unavoidable in tetrahedral graded meshes.

In order to overcome this difficulty, one possibility is to use graded meshes which combine tetrahedra, hexahedra, prisms, and pyramids. So we show interpolation error estimates valid on anisotropic prisms and pyramids the for vectorial elements mentioned before. Finally, using those results, an optimal convergence result is proved for a mixed formulation of the Poisson problem on a polyhedron when edge singularities are present.

Keywords: Mixed finite elements, anisotropic meshes

Mathematics Subject Classifications (2010): 65N30

References

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Universidad de Buenos Aires
E-mail address: ajawtu@dm.uba.ar

Universidad Nacional de General Sarmiento and Conicet, Argentina
E-mail address: aldoc7@dm.uba.ar