

Approximation of singularly perturbed problems using anisotropic elements

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ABSTRACT

In this talk we will present some results on finite element approximation of problems with boundary layers using graded meshes.

Graded meshes require the use of flat or anisotropic elements and so, the classic theory for finite element error estimates, based on regularity assumptions, cannot be applied. However, it is now well known that the regularity assumption can be relaxed. Indeed, several results for anisotropic elements have been proved in the last 30 years. We will recall some of these results, analyzing in particular the differences between 2d and 3d and the need of approximations different from the Lagrange interpolation.

Finally, we will consider some singularly perturbed problems and give convergence and superconvergence results for bilinear elements on appropriate graded meshes.

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