

Residual-type a posteriori error estimates in the maximum norm and the energy norm will be given for linear finite elements on anisotropic triangulations. The error constants are independent of the diameters and the aspect ratios of mesh elements and, in the case of a singularly perturbed equation, of the small perturbation parameter. Both upper and lower a posteriori error estimates will be discussed, with the main focus on the Laplace equation and the H^1 norm.

Additionally, we shall discuss some perceptions on the accuracy of finite element approximations on anisotropic meshes. In this context, we shall recall some examples from the literature on the maximum angle condition. We shall also present examples of unanticipated pointwise convergence behaviour of Lagrange finite elements on anisotropic triangulations. In particular, we show that both linear and higher-order finite elements may exhibit lower than expected orders of convergence for singularly perturbed equations, as well as for the Laplace equation and for certain singular equations, and their accuracy may depend not only on the interpolation error, but also on the mesh topology.