

Adaptivity

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One of the basic techniques to solve a partial differential equation on the computer is the Finite Element Method (FEM). To approximate the functions from the solution space in a discrete way, the domain of interest is decomposed into simplices and local polynomials are considered. We will briefly introduce this technique for the simple case of the Laplace equation $-\Delta u = f$, which describes for example the heat flow on a domain with source terms f . To increase the accuracy of the discrete solution, it is necessary to refine the triangulation in the areas of large errors. This method is called Adaptive Finite Element Method (AFEM). We will explain the basic ideas of this method to understand the requirements placed on the mesh refinement. After this motivation, we will study in detail the special properties of the obtained triangulations.