

SPATIAL DISTRIBUTION OF ERRORS IN NUMERICAL SOLUTION OF PDES

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Abstract

In the adaptive numerical solution of PDEs, local mesh refinement based on a posteriori error analysis leads to near equilibration of the discretization error distribution over the domain. Since the discretized algebraic systems are not solved exactly, one should ask whether the spatial distribution of the algebraic error can differ from the spatial distribution of the discretization error. In the contribution we compare the spatial distribution of the algebraic and the discretization errors in several standard boundary value model problems. The results indeed demonstrate that the algebraic error can have large local components and it can dominate the total error in some part of the domain. The illustrated phenomenon is of general significance – it is not restricted to particular problems, dimensions or algebraic solvers.