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Stability, Consistency and Convergence: Reflections on the Lax–Richtmyer Equivalence Theorem

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Abstract. The Lax–Richtmyer theorem is one of the fundamental results in the theory of finite difference schemes, according to which a consistent finite difference approximation of a well-posed initial-value problem for a linear partial differential equation is convergent if and only if it is stable. We shall discuss the implications of this result or, rather, of its counterpart in the case of elliptic boundary-value problems, for finite difference approximations on nonuniform finite difference meshes.

Keywords: Lax–Richtmyer equivalence theorem; finite difference methods; elliptic boundary-value problems; nonuniform meshes; stability and convergence.

References

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