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ON THE ACCURACY OF MULTIGRID TRUNCATION ERROR ESTIMATES*

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Abstract. In solving boundary-value problems, multigrid methods can provide computable estimates of the truncation error by comparing discretizations on grids of different mesh sizes. In the standard formulation, such estimates are contaminated by errors larger than the truncation error itself unless the residual transfer operator satisfies a restrictive condition (typically valid for injection but not for full weighting) or is itself high-order accurate. This paper proves that a simple generalization based on the work of Schaffer leads to accurate truncation error estimates without these restrictions. Numerical results for several model problems illustrate the analysis.

Key words. multigrid, truncation error, tau extrapolation

AMS subject classifications. 65N15, 65N50, 65N55

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