STABILITY AND REGULARIZATION OF A DISCRETE APPROXIMATION TO THE CAUCHY PROBLEM FOR LAPLACE'S EQUATION [1]

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Abstract

The standard five point difference approximation to the Cauchy problem for Laplace's equation satisfies stability estimates — and hence turns out to be a well–posed problem — when a certain boundedness requirement is fulfilled. The estimates are of logarithmic convexity type. Herewith, a regularization method will be proposed and associated error bounds can be derived. Moreover, the error between the given (continuous) Cauchy problem and the difference approximation obtained via a suitable minimization problem can be estimated by a discretization and a regularization term.

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