The Cauchy problem for Laplace's equation via a modified conjugate gradient method and energy space approaches

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Abstract

In the present work, we focus on the resolution of the Cauchy Laplace problem using an energetic variational minimization approach in the framework of a finite element method. A new strategy of regularization, called a filtering procedure regularization, is developed. The advantage of using this new regularization is that it does not require a regularization parameter and is easy to implement. An optimal a priori error estimate is proven, for the first time up to our knowledge, in the context of the finite element method. Some numerical results are presented to illustrate the performance of our approach.