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Article Abstract

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A Domain Embedding Method Using the Optimal Distributed Control and a Fast Algorithm

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Abstract

We propose a domain embedding method to solve second order elliptic problems in arbitrary two-dimensional domains. The method is based on formulating the problem as an optimal distributed control problem inside a disc in which the arbitrary domain is embedded. The optimal distributed control problem inside the disc is solved rapidly using a fast algorithm developed by Daripa et al. [3,7,10– 12]. The arbitrary domains can be simply or multiply connected and the proposed method can be applied, in principle, to a large number of elliptic problems. Numerical results obtained for Dirichlet problems associated with the Poisson equation in simply and multiply connected domains are presented. The computed solutions are found to be in good agreement with the exact solutions with moderate number of grid points in the domain.

Keywords
domain embedding methods, optimal distributed control

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