On a Fourier Method of Embedding Domains Using an Optimal Distributed Control

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We propose a domain embedding method to solve second order elliptic problems in arbitrary two-dimensional domains. This method can be easily extended to three-dimensional problems. The method is based on formulating the problem as an optimal distributed control problem inside a rectangle in which the arbitrary domain is embedded. A periodic solution of the equation under consideration is constructed easily by making use of Fourier series. Numerical results obtained for Dirichlet problems are presented. The numerical tests show a high accuracy of the proposed algorithm and the computed solutions are in very good agreement with the exact solutions.

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