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Greedy-type algorithms based on finite element discretizations approximating elliptic PDE on cartesian product domains*

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Abstract

We study the convergence of a variant of the separated representation method for the approximation of a class of high-dimensional PDE of self-adjoint type posed in Cartesian product domains. This method, roughly speaking, proceeds by iteratively adding to a previous iterate a tensor-product function such that the resulting new iterate has minimal residual. Here we analyze a variant of the method whose residual minimization ansatz set is the manifold of tensor products of finite element spaces—more flexible and closer to what is used in practice than the spectral method-based variants previously analyzed.

Key words: High-dimensional PDE, finite element methods, greedy algorithms

Mathematics subject classifications (1991): 65N15, 65D15, 65N30, 41A63, 41A25

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