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**Dual-primal FETI methods for three-dimensional elliptic problems with heterogeneous coefficients.** (English) [Zbl 1032.65031](#)

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Authors' abstract: Certain iterative substructuring methods with Lagrange multipliers are considered for elliptic problems in three dimensions. The algorithms belong to the family of dual-primal finite element tearing and interconnecting (FETI) methods which recently have been introduced and analyzed successfully for elliptic problems in the plane. The family of algorithms for three dimensions is extended and a full analysis is provided for the new algorithms. Particular attention is paid to finding algorithms with a small primal subspace since that subspace represents the only global part of the dual-primal preconditioner. It is shown that the condition numbers of several of the dual-primal FETI methods can be bounded polylogarithmically as a function of the dimension of the individual subregion problems and that the bounds are otherwise independent of the number of subdomains, the mesh size, and jumps in the coefficients. These results closely parallel those of other successful iterative substructuring methods of primal as well as dual type.

Reviewer: [I.Secrieru \(Chisinau\)](#)

**MSC:**

[65F10](#) Iterative numerical methods for linear systems

[65N30](#) Finite element, Rayleigh-Ritz and Galerkin methods for boundary value problems involving PDEs

[65N55](#) Multigrid methods; domain decomposition for boundary value problems involving PDEs

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**Keywords:**

[domain decomposition](#); [Lagrange multipliers](#); [FETI](#); [dual-primal methods](#); [preconditioners](#); [elliptic equations](#); [finite elements](#); [heterogeneous coefficients](#)

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