

# Dual-Primal FETI Algorithms for Linear Elasticity

Olof B. Widlund \*

March 12, 2003

The FETI algorithms form one of three families of domain decomposition methods that have been implemented and severely tested on the very largest existing parallel computer systems; the other two are the Balancing Neumann-Neumann methods and the Overlapping Schwarz methods with at least two levels.

The analysis of the FETI methods has posed a very real challenge but by now a coherent theory has emerged. Algorithmically and theoretically, the main research emphasis is now on the Dual-Primal FETI methods. Previous theoretical work on scalar elliptic problems, such as those arising in heat conduction in highly heterogeneous materials, has recently been extended to linear compressible elastic materials with the goal of obtaining convergence rates of the iteration which are independent of even large changes in the Lamé parameters across the interface between the subdomains. At the same time, it is important to keep the cost related to the coarse global problem of the preconditioner, which is required to ensure scalability, small. There are also interesting problems of numerical linear algebra related to these algorithms.

This research is conducted jointly with Axel Klawonn of the University of Essen, Germany. The authors acknowledge the importance of a series of conversations with Charbel Farhat, Michel Lesoinne, and Kendall Pierson for the development of the results.

---

\* Courant Institute of Mathematical Sciences, 251 Mercer Street, New York, NY 10012  
E-mail: [widlund@cims.nyu.edu](mailto:widlund@cims.nyu.edu)