# Highly scalable parallel domain decomposition methods with an application to arterial wall modeling

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Highly scalable parallel domain decomposition methods for elliptic partial differential equations are considered with a special emphasis on problems arising in elasticity. The focus of this talk is on Finite Element Tearing and Interconnecting (FETI) methods, a family of nonoverlapping domain decomposition methods where the continuity between the subdomains, in principle, is enforced by the use of Lagrange multipliers. Algorithmic variants are described and theoretical convergence estimates are presented together with numerical results confirming the parallel scalability properties of these methods. Parallel and numerical scalability of the methods for more than 65 000 processor cores of the JUGENE supercomputer at the Forschungszentrum Jülich is shown. An application of a dual-primal FETI method to a nontrivial biomechanical problem from nonlinear elasticity modeling arterial wall stress is given, showing the robustness of our domain decomposition methods for such problems.

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