FETI-R (Part I): Regularized energy principles for floating domains

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Abstract

Finite element discretizations of linear elasticity equations for a floating domain lead to linear systems with non-trivial kernels. In this talk we consider an alternative finite element framework in which discrete problems are derived directly from the principle of minimum potential energy and represent quadratic programs rather than linear systems. Starting from an optimization problem posed on complement spaces we develop a regularized potential energy principle. We show that the optimality system of the regularized principle is coercive on $H^1(\Omega)$. As a result, the associated finite element quadratic program leads to symmetric and positive definite linear systems.

We also prove that global minimizers of the new potential energy functional solve the linear elasticity equations whenever the body force and the surface traction are in equilibrium.

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