FETI-R (Part II): A regularized variational approach for Finite Element Tearing and Interconnecting

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Abstract

The coarse grid problem of the original FETI method augments the Lagrange multipliers with the floating subdomain rigid body modes. For second order linear elasticity or Poisson problems, these modes arise because of the pure traction or Neumann boundary conditions associated with floating subdomains. Any efficient implementation of the FETI method must efficiently solve the coarse grid problem so that scalability is not compromised.

Our presentation investigates an alternative approach for handling the rigid body modes associated with the floating subdomains. We extend the optimization based finite element approach and derive the discrete FETI problem from a regularized minimum potential energy principle. The associated weak problem is coercive in $H^1(\Omega)$ and over all subdomains. This leads to symmetric positive definite local stiffness matrices and so can reduce the FETI coarse grid problem.

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