First-Order System Least Squares for Elastic Contact Problems

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Starting from a first-order system least squares formulation for linear elasticity which approximates displacements in H^1 and stresses in $H(\mathrm{div})$, contact constraints may be incorporated by augmenting the least-squares functional. Ellipticity of the bilinear form on the admissible subset in the displacement-stress space provides the reliability of the element-wise evaluation of the functional as an a posteriori error estimator. The efficiency of this approach to error estimation can be evaluated during the computation.

The treatment of Coulomb friction in a first-order system least squares setting will be discussed as well as the effects of the approximate representation of the contact boundary on the convergence behavior. The findings will be illustrated by computational results on sequences of adaptively refined triangulations.