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Stabilized hp-BEM for frictional contact problem in linear elasticity

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Abstract

We consider Tresca-frictional contact for linear elasticity in \mathcal{R}^2 . We use the Poincare-Steklov operator, which realizes the Dirichlet-to-Neumann map, and represent the negative of the unknown traction on the contact boundary by a vector-valued Lagrange multiplier. In order to avoid the discrete inf-sup-condition a mesh-dependent stabilization term is added to the discrete mixed formulation. In particular, this allows the use of the same mesh on the contact boundary for both primal and dual variables, which, from an implentation point of view, is desireable. The resulting discrete formulation can be solved efficiently by a semi-smooth Newton algorithm.

We prove the well-posedness of the formulation as well as an a priori and a posteriori error estimate.

Numerical experiments are given which support our theoretical results.

Key words: Stabilized mixed boundary elements, Tresca friction, Signorini contact Mathematics subject classifications (1991): 65N38, 65N12, 65N15

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