FICTITIOUS DOMAIN AND NITSCHE'S METHOD APPLIED TO CONTACT PROBLEMS IN ELASTICITY

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ABSTRACT

This work deals with unilateral contact problems between two elastic bodies (*c.f.* FIGURE 1). A stabilized fictitious domain method using Nitsche's method [3] in order to approximate the contact and boundary conditions is presented.

In this paper, we generalize the analysis in [1], to the case of two elastic bodies and a fictitious domain approach. We consider the case of the small deformation of two elastic bodies with a nonzero initial gap, a potential contact zone and Dirichlet and Neumann boundary conditions. We use a stabilized fictitious domain method [2] inspired by the extended finite element method.
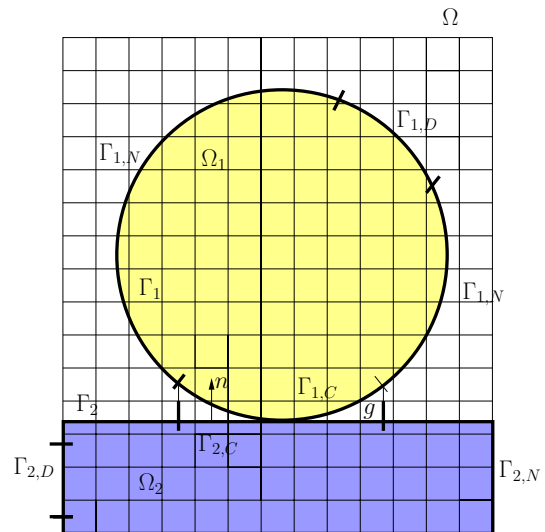
Figure 1: Example of fictitious domain for a contact problem between two elastic bodies.

First, we show the consistency of the presented discrete method together with existence and uniqueness results. Furthermore, we state an optimal a priori error estimate. This is a remarkable property of the method since, as far as we know, this represent the first optimal a priori error estimate for a contact problem with a fictitious domain approach. Finally, we present some numerical experiments to illustrate the capacity of the method.

REFERENCES

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