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IMPERFECT INTERFACES WITH UNILATERAL CONDITIONS: THEORETICAL AND NUMERICAL STUDY

Serge Dumont[1], Frédéric Lebon[2], Raffaella Rizzoni[3]

[1]Université de Nîmes, Site des Carmes, Place Gabriel Péri, 30000 Nîmes, France, serge.dumont@unimes.fr

[2]Laboratory of Mechanics and Acoustics, Aix-Marseille University, CNRS, Centrale Marseille, 4 Impasse Nikola Tesla, CS40006 13453 Marseille Cedex 13, France, lebon@lma.cnrs-mrs.fr

[3]Department of Engineering, University of Ferrara, Via Saragat 1, 44122 Ferrara, Italy, raffaella.rizzoni@unife.it

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Adhesive bonding is an assembly technique often used in structural mechanics. In bonded composite structures, the thickness of the glue is much smaller than the other dimensions.
In this presentation, numerical strategies are presented to simulate the solid/solid interface behaviour. A particular attention will be paid to take an unilateral condition into consideration to avoid penetration. A first result of the paper is that it is possible to apply a methodology based on asymptotic expansions to this kind of material. Then, a finite element method, using a Nitsche's method to take into account the unilateral contact condition [1, 3], is introduced to solve both the initial problem, considering the thin layer and the limit problem, approximating the thin layer behaviour with contact conditions.
Numerical results are provided to show the capabilities of the procedure, especially in the case of graded materials.

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