

## DEBONDING CONTACT : MODELS, FORMULATIONS, SOLVERS AND APPLICATIONS

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### ABSTRACT

The presentation gives an overview of the works conducted at the LMA on adhesion and friction modeling in the last few years and presents very recent results on healing adhesion and on bipotential formulation for adhesive contact. Three parts will be presented.

The first one is related to the RCCM model (see [1] [2]) which is a model coupling unilateral contact, friction and adhesion and taking into account viscosity effects on the interface. It is based on a damage variable, considered as an intensity of adhesion, first introduced by M. Fremond ([3]). In comparison with the classical models (Dugdale, Barenblatt, Tvergaard, Needleman, ...) its specificities are related to the smooth transition from total adhesion to frictional contact and, as said before, the eventual viscosity of the interface behavior. A recent extension to healing and reversible adhesion will be then presented ([4]). It permits to model adhesive effect without contact as the one observed for contact between rubber and glass (Van der Waals forces) and of course partial or total recovering adhesion (as for adhesive tapes to take a very simple example). A recent general formulation for that class of adhesive models has been given (see [5]).

The second part concerns the variational formulations which have to fit the non smooth character of the interface behavior laws. A variational inequality formulation is given for quasi-static problems ([1]). The Non Smooth Contact Dynamics of Moreau-Jean ([6]) is used for dynamics problems. A recent extension to the adhesion of the bipotential theory of G. De Sacxe is presented. In all the cases, the solvers will be given.

Finally, several applications will be briefly presented in various domains : composite mechanics, civil engineering , glass rubber/contact, architecture, ...)

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