DECOMPOSITION METHODS
FOR ADHERENCE PROBLEMS IN FINITE ELASTICITY

P. LE TALLEC, A. LOTFI

Service de Mathématiques
LABORATOIRE CENTRAL des PONTS & CHAUSSEES
58 Blvd Lefebvre, 75732 PARIS Cedex 15 (France)

Summary

The problem discussed in this paper consists in computing the large deformations of incompressible elastic bodies which are glued (not fixed) on part of their boundaries. The proposed numerical technique is based on the augmented Lagrangian approach already used in Glowinski-Le Tallec [1982] for the numerical solution of two-dimensional equilibrium problems in Finite Elasticity, and is organized as follows:

i) the adhesion problem is first discretized in time, which reduces it to a sequence of contact problems in Finite Elasticity with friction forces;

ii) each contact problem is then transformed into a saddle-point problem obtained by considering the displacement, the strains and the relative displacement at the contact surface as independent variables;

iii) these saddle-point problems are finally solved by an iterative technique which considers one variable at a time, thus reducing the global algorithm to the successive solution of a linear elasticity problem with a fixed stiffness matrix, of homogeneous local finite elasticity problems, and of local adhesion problems set on the contact surface.