

Non-smooth contact phenomena and surface damage

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We present a model describing damage processes in a (nonlinear) elastic body which is in contact with adhesion with a rigid support. On the basis of phase transitions theory, we detail the derivation of the model written in terms of a PDE system, combined with suitable initial and boundary conditions. Some non-smooth internal constraints on the variables are introduced in the equations and on the boundary to get physical consistency and unilateral conditions. Existence of global in time solutions is proved for a weak formulation. Hence, we exploit an asymptotic analysis considering the interfacial damage energy (between the body and the contact surface) going to $+\infty$. At the limit we get a weak formulation of a damage problem with dissipative boundary conditions.

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