

# Coupling of rate-independent and rate-dependent systems with application to delamination processes in solids

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This talk addresses the modeling of delamination processes in elastic solids using an internal delamination variable with a rate-independent, unidirectional evolution law. This covers models for brittle, Griffith-type delamination, which describe sharp cracks in terms of a non-smooth constraint confining displacement jumps across interfaces to the null set of the delamination variable, as well as adhesive contact models, which regularize this constraint by a finite surface energy contribution. A notion of solution suited for non-smooth PDE-systems of coupled rate-dependent and rate-independent dynamics is introduced. Existence results for the delamination models are deduced. In this context, for a viscoelastic solid with dynamic effects, the limit passage from models for adhesive contact to brittle, Griffith-type delamination is discussed in the sense of evolutionary Gamma-convergence. Fine properties of the solutions are established by studying a simplified model.