

A quantitative geometric rigidity result in SBD and the derivation of linearized models from nonlinear Griffith energies in fracture mechanics

MANUEL FRIEDRICH

Affiliation: Faculty of Mathematics, University of Vienna, Vienna, Austria

email: manuel.friedrich@univie.ac.at

We derive Griffith functionals in the framework of linearized elasticity from nonlinear and frame indifferent energies via Gamma-convergence. The convergence is given in terms of rescaled configurations measuring the displacement of the deformations from piecewise rigid motions which are constant on each connected component of the cracked body. The key ingredient to establish a compactness result is a quantitative geometric rigidity result for special functions of bounded deformation (SBD). This estimate generalizes the result of Friesecke, James, Müller in nonlinear elasticity theory and the piecewise rigidity result of Chambolle, Giacomini, Ponsiglione for SBV functions which do not store elastic energy. The results are in part with Bernd Schmidt (Augsburg).