

*Abstract:* Polyconvexity is a standard assumption on hyperelastic stored energy densities which, together with some growth conditions, ensures the weak lower semicontinuity of the respective energy functional. The present work first reviews known results about gradient polyconvexity, introduced by Benešová, Kružík and Schlömerkemper in 2017. It is an alternative property to polyconvexity, better-suited e.g. for the modelling of shape-memory alloys. The principal result of this thesis is the extension of an elastic material model with gradient polyconvex energy functional to an elastoplastic body and proving the existence of an energetic solution to an associated rate-independent evolution problem, proceeding from previous work of Mielke, Francfort and Mainik.