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Selection of folding mechanisms based on the maximum rock strength

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The objective is to propose simple procedures, compared to the finite-element method, to select and optimize the dominant mode of folding in fold-and-thrust belts and accretionary wedges. Mechanical equilibrium as well as the constraints due to the rock strength limit in the bulk material and along major discontinuities are accounted for. The *first* part of the method consists in estimating the upper bound on the tectonic force with the application of the maximum strength theorem (Maillot and Leroy, 2006), which is at the core of the external approach of limit analysis. The structure geometrical features are optimized to obtain the least upper bound on the tectonic force. The dominant mode of folding is the one leading to the smallest of the least upper bounds. For example, it is shown how the normal sequence of thrusts in an accretionary prism is interrupted by an out-of-sequence thrust (Cubas et al., 2007). The *second* part of the method is based on the application of the Equilibrium Element Method (Krabbenhøft et al., 2005), which is a numerical solution to the internal approach of limit analysis. The optimum stress field provides the lower bound on the tectonic force. The example discussed is the fault-bend fold composed of a block gliding over a flat décollement and with a single pre-defined ramp. Activation of the whole décollement and the ramp requires localized failure in the bulk, typical of a back-thrust rooted at the base of the ramp (Souloumiac et al., 2007). Application of the two procedures to an evolving fault-bend fold provides the stress distribution over the optimized structure, as well as an error estimate for the tectonic force. The smaller the error, the more likely will be the optimized structure and the predicted stress distribution.