COMPUTATIONAL MODELING OF SHAPE MEMORY MATERIALS

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ABSTRACT

A sharp-interface model describing static equilibrium configurations of shape mory alloys introduced in [1] is extended to a quasistatic situation and computationally tested. Elastic properties of variants of martensite and the austenite are described by polyconvex energy density functions. Volume fractions of prticular variants are modeled by a map of bounded variation. Additionally, energy stored in martensite-martensite and austenite-martensite interfaces is measured by a interface-polyconvex function. It is assumed that transformations between material variants are accompanied by energy dissipation which, in our case, is positively and one-homogeneous giving rise to a rate-independent model. Two-dimensional computational examples are presented. This is a joint work with Miroslav Frost and Martin Kružík (both Prague).

REFERENCES

[1] ŠILHAVÝ, M., Phase transitions with interfacial energy: interface null Lagrangians, polyconvexity, and existence. In: K. Hackl(ed.) *IUTAM Symposium on Variational Concepts with Applications to the Mechanics of Materials*, pp. 233–244. Springer, Dordrecht (2010).