COMPUTATIONAL MULTISCALE MATERIAL OPTIMIZATION OF TWO PHASE POLYCRYSTALLINE MATERIALS

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In recent years computational multiscale material modeling (CMMM) has enjoyed increasing interest in computational mechanics and material science. One of the advantages of CMMM is that the representative volume element (RVE) at the meso-micro scale can be altered numerically in a number of ways, thus providing "virtual manufacturing" of a (new) material.

In this contribution we use the CMMM concept to optimize a material with respect to desired macroscopic response for a specific loading condition. In particular, we consider large strains developing at the bending of plates made of duplex stainless steel. The volume fraction of the two phases, austenite(γ) and ferrite(α) in this particular case, and the geometrical anisotropy of the α-phase are chosen as typical control parameters in the optimization process, since it is possible to control these parameters in the real manufacturing process.