

Derivation of a rod theory for multiphase materials

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Abstract

A rigorous derivation is given of a rod theory for a multiphase material, starting from three-dimensional nonlinear elasticity. The stored energy density is supposed to be nonnegative and to vanish exactly on a set consisting of two copies of the group of rotations $SO(3)$. The two potential wells correspond to the two crystalline configurations preferred by the material. We find the optimal scaling of the energy in terms of the diameter of the rod and we identify the limit, as the diameter goes to zero, in the sense of Gamma-convergence.