Abstract Submitted
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Interfaces in ferroelastics: fringing fields, scaling, size and shape effects[1] TURAB LOOKMAN, Los Alamos National Laboratory — We consider the problem of determining the elastic fields and microstructure within a transformable region of size L, in which structural transformations from a parent to a product phase with variants can occur, that is surrounded by a fixed parent matrix. By demanding mechanical equilibrium and strain compatibility at the parent-product interface, we demonstrate that for sufficiently coarse twins the width of the twinned product phase varies as sqrt(L), but this breaks down if L is small enough for the surface and bulk energies to compete. As L decreases further, a transition to a stable checkboard pattern containing the parent and product variants occurs and this subsequently disappears if L is too small. We relate our findings to the behavior of transformations in nanograins of NiTi within an amorphous matrix and nanoscale checkboard microstructure seen in inorganic spinels. Understanding how microstructure emerges from a given configuration of interfaces is a non-trivial task and our overarching theme is to study the interplay of orientations, decaying strain fields, length scaling of energy and dependence of transition on size and shape of a transformable region within a parent matrix.

[1]Work performed in collaboration with M. Porta, T. Castan, P. Lloveras (U. of Barcelona), A. Saxena (LANL) and S. Shenoy (U. of Hyderabad).

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