Tensor Distinction of Domain States in Ferroic Phase Transitions

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Distinction of domain states in ferroic phase transitions by their tensor properties is of importance in domain engineering. This is simple if the ferroic group is a halving subgroup of the parent group. In such cases there are two domains which differ only by the sign of primary transition parameter. However, even in these cases we may run into complications if the transition parameter is not a cartesian tensor components but a linear combination of such components as in cases of parent groups of tetragonal and higher symmetries. For ferroic transitions associated with two- and three-dimensional *R-ireps* we meet even more complicated relations which are a consequence of the fact that symmetry allowed tensor forms are invariants of the symmetry groups while their cartesian components are generally not invariant. The use of the ordinary transformation formulae is awkward and error inviting in these cases.

Transition parameters are generally expressed as components of tensorial covariants [1]. To find changes of cartesian components at the ferroic transition we proposed a method consisting of "labelling of covariants" followed by "conversion equations" This method facilitates the description of individual domain states in terms of cartesian tensor components and hence also their distinction.

[1] Kopský V., *Phase Transitions*, 2001,**73**, No.1-2, 1-422.

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