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**Determination of symmetry relations between higher order
material constants for the study of nonlinear acoustic properties of
piezoelectric crystals of any symmetry class**

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Each crystal is invariant under a given point symmetry operation. This results in relations between the different material property constants, such as second order elastic constants, second order piezoelectric constants and second order dielectric constants. Those relations are well reported in text books for the linear behavior of crystals. When nonlinear effects are studied, higher order constants play a significant role and their symmetry relations have only been reported in the literature for a limited number of crystal classes. The problem with higher order constants is that it is rather complicated and very time consuming to study the symmetry relations. This paper presents a newly developed semi-automatic computer program that is able to handle any kind of symmetry relation. Results are reported for all the different crystal classes for the higher order constants, i.e. third order elastic constants, third order piezoelectric constants, third order dielectric constants and electrostrictive constants. The results are important for the study of nonlinear properties of crystals and composites and will ease the experimental quantitative determination of all linear and nonlinear material constants of crystals.