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Nonlinear Elasticity as a Guide for Exploring High Pressure/Shear Stability T.W. WRIGHT, Johns Hopkins University — Recent constitutive representation theorems for nonlinear anisotropic elasticity, Wright [2011], show the characteristics of elastic response for materials in any point group. All anisotropic representations consist of a sum of six terms, and each term consists of a scalar function of anisotropic invariants times a "tensor generator," which has the same invariance under group transformations as the stress itself. Knowledge of these representations shows promise as a guide for exploring material stability under extreme loading conditions. Although much is known both experimentally and theoretically about material stability under high pressure, far less is known about the effect of large shear stress superimposed on high pressure. Stress has six independent components, so study of the effects of pressure alone leaves the other five dimensions unexplored. Rather than random DFT calculations in the five dimensional deviatoric space, the known structure of the six term representations suggests that systematic study of just one additional dimension at a time could be accomplished by following changes in just one additional term in the representation at a time. These ideas will be illustrated in the context of a program designed to explore the effect of shear on amorphization in B4C, a ceramic often used for ballistic protection. *T.W. Wright, Bootstrap elasticity: From linear to nonlinear constitutive representations, accepted for publication, J. Elasticity.*

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