Preprint

THE MURNAGHAN EQUATION OF STATE AND HIGH-PRESSURE COMPRESSION CURVE FOR ANISOTROPIC NON-CUBIC CRYSTALS*

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ABSTRACT -- The two parameters of the Murnaghan equation of state can be determined accurately by ultrasonic measurements on either single-crystals or polycrystalline aggregates. However, for anisotropic non-cubic crystals, the values determined ultrasonically on aggregates are different from the corresponding values calculated either from the single-crystal second-order elastic constants and their first pressure derivatives or from the single-crystal third-order elastic constants. For moderately anisotropic solids, like cadmium (hexagonal) and corundum (trigonal), the bulk modulus of single-crystal materials is always smaller than that of the corresponding aggregates of zero-porosity. On the other hand, the pressure derivative of the bulk modulus of single-crystal material is larger than the corresponding quantity determined on pore-free polycrystalline aggregates. A consequence of these differences is that the two parameters in the Murnaghan equation derived from

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