DISCUSSION AND CONCLUDING REMARKS

The Murnaghan parameters for anisotropic non-cubic crystals derived from the single-crystal acoustic data based on the usual application of elasticity theory are different from the corresponding parameters determined on polycrystalline aggregates, even though free of pores. Thus, the compression curve predicted by the Murnaghan equation of state using the single-crystal acoustic parameters is also different from that derived from the polycrystalline materials. This difference, illustrated with hexagonal cadmium, trigonal α-quartz, and trigonal corundum, is small for crystals of relatively low anisotropy but, for highly anisotropic crystals, the difference appears to be significant.

Consider Fig. 5, a plot of the difference between the single-crystal bulk modulus and polycrystalline bulk modulus against percent elastic anisotropy in compression for all the hexagonal crystals of which the single-crystal elastic constants are accurately known. It is apparent from this figure that, as the elastic anisotropy becomes large, the difference in the bulk moduli also becomes large. Similarly, one expects the same trend of the difference for the pressure derivative of the bulk modulus (see Table 1).

In conclusion, the two parameters in the Murnaghan equation of state defined by Eqs. (5) and (6) seem still useful for the description of the pressure-volume relation of a