is the validity of the parameter H_e/e in characterizing the magnetization curve. This is seen in Fig. 6 where the experimental magnetization curves, plotted as a function of this parameter, are self-similar.

In retrospect, independent grain behavior appears more reasonable than interacting grain behavior. In the previous article,[6] the equilibrium exchange and demagnetizing energy was predicted to increase as the fourth root of the strain. It was further predicted to be small compared to the induced anisotropy energy. It follows that the energy of domain walls is small and an intragrain domain structure would occur. Considering this, one would expect independent grain behavior. Conversely, experimental agreement with the independent grain theory adds support to the validity of the calculation which predicts the negligible contribution of the equilibrium exchange and demagnetizing energy at the magnitude of strain occurring in this work.

The prediction of magnetic behavior behind the shock front is much simpler than the equivalent prediction in unstrained material. First, the equilibrium exchange and demagnetizing energy can be ignored in favor of the much simpler induced anisotropy energy. This is not the case in unstrained material. Second, in polycrystalline material the magnetic grain interaction effects are not substantial and magnetic properties can be obtained by averaging the behavior of a single independent grain.

It was stated in Sec. III that the magnetic material used in this work had a slight porosity. This is typical of most magnetic ceramics. Wayne *et al.*[35] have reported that the macroscopic magnetization of porous magnetic material subject to hydrostatic pressure is affected due to nonhydrostatic strains occurring in the vicinity of pores. It seems evident that this effect should occur in the uniaxial strain case also. Calculations predict that the effect of porosity on the magnetization curves obtained in the present work will be small for large applied fields but become substantial as the applied field approaches zero.[36] The region of the magnetization curve experimentally observed was chosen to circumvent the porosity problem.

Contribution to the shock-induced anisotropy effect due to finite strain was calculated.[36] This was demanded by the high strains obtained in the present work. Calculations show that the contribution is not substantial. The experimental data verify this conclusion. It follows that, at least for the present material and experimental accuracy, the conventional magnetoelastic theory of Becker and Doring provides an adequate description of shock-induced anisotropy in the region of large elastic strain.

The present work seems to be consistent with previous data on YIG obtained by Shaner and Royce.[3] Their 90-kbar data, which are twice the highest stress obtained in this work and about 30 kbar above the Hugoniot elastic limit, fall slightly above the predicted magnetization curve for the independent grain theory. Their 200- and 440-kbar data are higher yet. Their data are compared with the present work by assuming a simple elastic-plastic model for the behavior above the Hugoniot elastic limit. This discrepancy has been discussed recently by Royce[4] and is attributed to the effect of porosity and to the change in saturation magnetization for the higher-pressure data.

VI. SUMMARY

The conclusions reached and results obtained during the course of this work are as follows:

(i) Consideration of the averaging process required to predict the shock-induced anisotropy effect in polycrystalline material reveals the importance of magnetic grain interaction. Extreme assumptions of interacting grains and independent grains are defined to describe this interaction. Magnetization curves are obtained for both assumptions.

(ii) Data on polycrystalline yttrium iron garnet were obtained in the region of large elastic strain. The results support the independent grain theory as more representative of actual magnetic behavior. Earlier theoretical work assumed interacting grain behavior.

(iii) The experimental results are in agreement with the domain-theory analysis of the preceding paper which predicts the negligible contribution from exchange and demagnetizing effects.

(iv) Conventional magnetoelastic theory provides a sufficient characterization of the shock-induced anisotropy effect within present experimental accuracy for strains up to at least $\frac{2}{3}$ the Hugoniot elastic limit.

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*Present address: Stanford Research Institute, Menlo Park, Calif.

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present article. A measure of the deviation from uniform strain can be calculated from the elastic constants of the bulk material and the isotropy factor of the cubic structure (see Ref. 36). It is small for YIG which has an isotropy factor of 0.95.

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