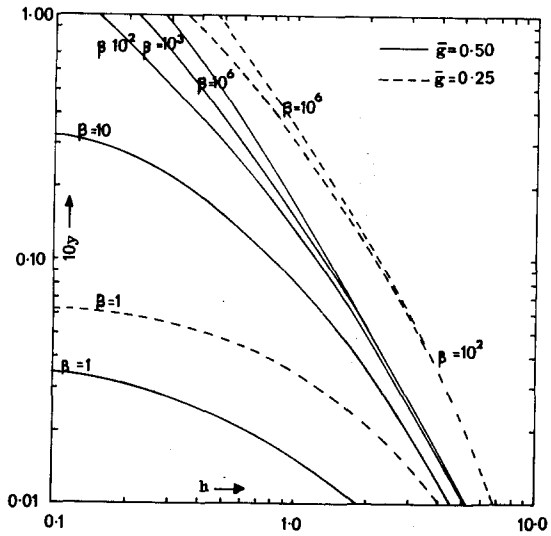

FIG. 2. Log–log plot of $10y$ against h for several β values using series limits (3 3 3) and $\bar{g}=0.25$, 0.50.

values are correspondingly small. The broken line in Fig. 1 is an estimate of the maximum limit of y as a function of field which satisfies the condition of ψ small. It will be observed that for $\beta>10^2$ the results are valid only for $h>1$, e.g., in Fe with $R\sim200$ Å, applicability is limited to $H>2\times10^4$ Oe, and in YIG with $R\sim10^3$ A, $H>1800$ Oe.[1] By increasing the magnitudes of the upper limits large reductions in energy can be obtained. The behavior of y and $\Delta=3E_T/(4\pi^2R^3I_0^2)$ for various series limits has been studied. For example, for the series $(L\ M\ O)$ with $\beta=10$, $\bar{g}=0$, and $h=0$, it is found that y and Δ do not converge for $M>7$, and that for L, $M>7$, the assumption of ψ small is contravened. The results for the series $(L\ M\ N)$ for different limits cannot be systematically studied, and our choice of (3 3 3) for Fig. 1 is made solely for comparison with other work.[4] The calculation of $\bar{g}$ for any particular problem must be made along the classical lines of Stoner and Wohlfarth.[8] In the simplest case when the inclusion magnetization is perfectly hard and the easy directions randomly oriented we have $\bar{g}=0.5$. In Fig. 2 is shown y against h for this and for some other values of $\bar{g}$, and the general behavior is as would be expected; the effect of the cavity is gradually reduced because of the diminution of surface pole density at the matrix–inclusion interface. The range of applicability of the calculations in terms of the applied field values is correspondingly increased.

[8] E. C. Stoner and E. P. Wohlfarth, Phil. Trans. Roy. Soc. **A240**, 599 (1948).

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Direct Evidence of the Interaction of Domains with Atomic Scale Imperfections in GdIG*

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Optical observations of the interaction of domains with atomic scale imperfections are presented. Thin transparent {100} orientation wafers of GdIG are prepared from 20 mil-thick slabs by chemical polishing, and in this process etch pits develop which reveal line imperfections in the crystal. These may be individual dislocation lines or other minor structural defects. Domains are both pinned and nucleated at these lines. Interesting cooperative effects occur when a number of lines can be identified in the same sample. It is often observed, for example, that nucleation and initial domain growth take place on the same side of all the lines. In some cases a small residual domain near a line imperfection appears to influence the domain structure throughout the sample, and has the effect of favoring one saturated remanent state over the other. When the residual domain collapses, the effect disappears. Magnetostrictive stress between the domain and the rest of the sample may be responsible for this behavior.

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