the first term being an asymptotic value for $Z \rightarrow \infty$. In the quadratic extrapolation the first three terms of the isoelectronic sequence (lowest Z) are used for determining a quadratic in Z. Therefore, this quadratic cannot be justified as an asymptotic hydrogen-like formula. The parameters a_1 and a_2 play an essential part in the numerical value of the electron affinities.

The results are given in column (3) of Table 1 (the observed ionization potentials for the Si^- sequence are insufficient to apply our method) and are seen to agree within experimental error for all observed cases except S^-. The discrepancy in S^- may be due to incorrect experimental data on the ionization potentials of Cl I and its sequence.

A detailed report of this work will be published elsewhere.

H. R. JOHNSON

Department of Astro-Geophysics,
University of Colorado,
Boulder, Colorado.

F. ROHRLICH

Department of Physics,
Johns Hopkins University,
Baltimore, Maryland.

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Magnetic Viscosity displayed on Hysteresis Loop Traces

THE earliest measurements relating the rate of change of flux to applied field under pulsed conditions were made by Sixtus and Tonks[1]. They measured the rate of propagation along a nickel wire of a wave-front of flux change and so obtained a measure of its magnetic 'viscosity'. More recently, Galt[2] has performed similar measurements involving a single domain wall in a crystal of nickel–iron ferrite. Since then, I have made measurements of magnetic viscosity in polycrystalline magnesium–manganese ferrite ('Ferroxcube' *D*1) during continuous hysteresis loop tracing, this particular ferrite exhibiting a rectangular hysteresis loop.

The method used here involved the superposition of pulsed and a.c. magnetizations. This was accomplished with negative feed-back control of the flux wave-form in the specimen, the apparatus used being fully described elsewhere[3]. It is sufficient to remark that with this apparatus over a wide range of frequency the flux wave-form corresponds almost exactly to the voltage applied to the system.

To produce the required pulse, in addition to the sine wave input normally employed, there was superposed at the same frequency a square wave with the slope of its rising and falling edges adjustable over a wide range. Thus for the duration of each edge the change of flux was rapid and constant, and throughout the remainder of the cycle it was much slower.

At the repetition frequency chosen, 330 c./s., the effect of magnetic viscosity was small, although not negligible. The rate of change in the accelerated portion of flux reversal could correspond to applied frequencies as high as 250 kc./s. or as low as 500 c./s. For these two limits, the increases in magnetizing field required were 96 and 3 per cent, respectively, of the coercive force, measured from the static loop.

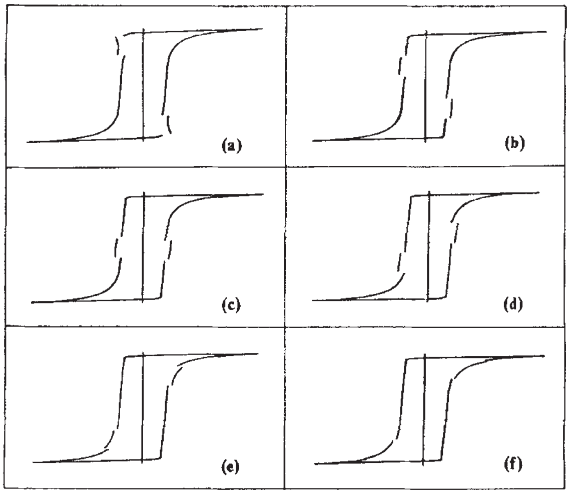

Fig. 1. Hysteresis loops with superimposed a.c. and pulsed excitations

Fig. 1 shows tracings from photographs of hysteresis loops produced by this method. The point of acceleration is shown by an outwards jump in H on the hysteresis loop, and the end of the accelerated portion by a returning jump. For the six different traces the point of acceleration occurs progressively later in the cycle. The accelerated rate of change of B was the same in each, being $1{\cdot}25 \times 10^4$ Wb./m.²/sec. (with $B_m = 0{\cdot}236$ Wb./m.², $H_m = 500$ amp. turns/m., $H_c = 77$ amp. turns/m.), but it will be seen that the initial step in H progressively decreases from one trace to the next. However, it has been found that the converse is true for the magnitude of the step when measured at the point $B = 0$. In trace (*c*) this step was 25 amp. turns/m.

The equation $dB/dt = k(H - H_0)$, which is of the same form as those obtained by Sixtus and Tonks and by Galt, was found to apply only when $(H - H_0)$ was large, of the order of 20 amp. turns/m. or more. The constant k was found to vary markedly as the point of acceleration was changed, and to a lesser extent as H_m was varied. The maximum value for k, measured when $B = 0$, was 5×10^3 Wb./m. sec. amp. turns, and its minimum was about 10^3 Wb./m. sec. amp. turns in the linear range ; but in the non-linear range when $(H - H_0)$ was small k decreased even further, approaching 10^2 Wb./m. sec. amp. turns.

The departure from linearity at the lower field strengths, which was not experienced by Galt, is apparently due to the polycrystalline nature of the material, which gives rise to a larger number of mobile domain walls. Otherwise, the results for this material, and those obtained by Galt for a single domain wall are of an identical nature.

R. G. GEORGE

King's College,
University of London,
London, W.C.2.

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