

**Variation in the Longitudinal Incremental Permeability due to a Superimposed Circular Field**

DURING the course of an investigation of the variation of the longitudinal incremental permeability by a superimposed circular magnetic field, some rather interesting results were obtained with certain iron-nickel alloys. The ferromagnetic materials under investigation were of wire form and served as the core of a long slender solenoid. Direct current was passed through the core to produce the circular field, and the longitudinal permeability was calculated from inductance measurements on the solenoid.

Using well-annealed alloys, it was found that rather large increases in the longitudinal incremental permeability could be obtained as a function of a relatively small superimposed circular field, while upon twisting the conducting core a gradual change from an increase to a decrease in the incremental longitudinal permeability as a function of a superimposed circular field was obtained.

These effects are shown in Fig. 1 where curve (a) gives the variation of the inductance of the solenoid as a function of the direct current through the conducting core of an unstrained sample. Curve (b) is that obtained after the core has been twisted through 120°. Here the inductance of the solenoid without any core is 1.3 millihenries. In all measurements the effect of the earth's field was reduced to a minimum and the samples were completely demagnetized before each run.

Fig. 2 shows the variation in longitudinal incremental permeability of the core as a function of the

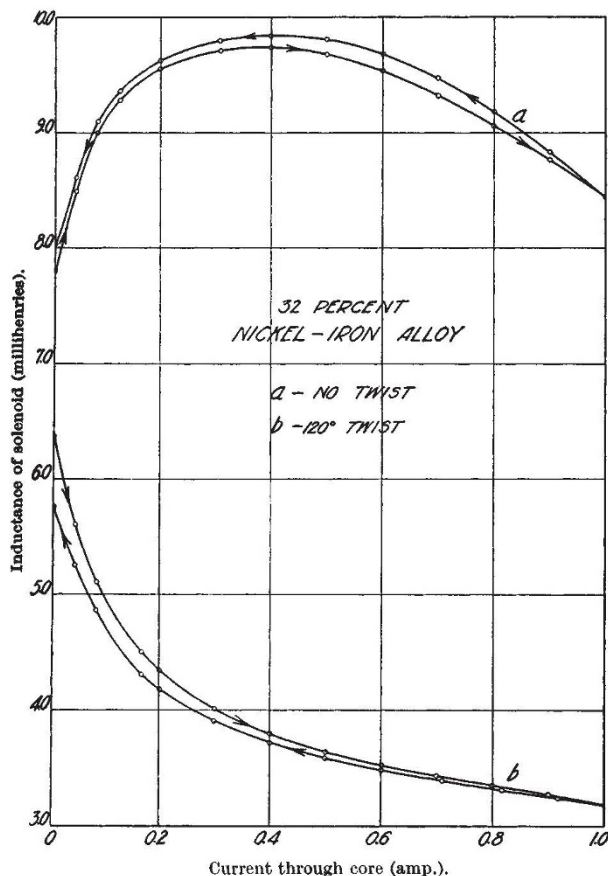


Fig. 1.

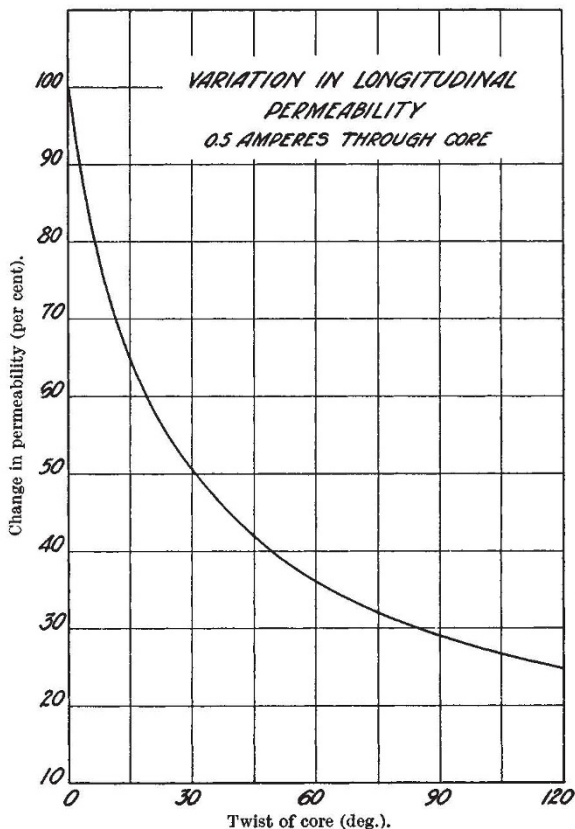


Fig. 2.

degree of twist when a current of 0.5 amp. passes through the core. Variations in permeability thus obtained on the samples were much greater than those obtained by twisting when no current passes through the core.

These large variations in inductance, obtained as a function of the current through the core or as a function of the degree of twisting of the core while carrying a definite current, appear to have many possible applications.

A complete account of this work covering all of the more common ferromagnetic materials will be given elsewhere.

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**Barnacles in Horsey Mere**

ON July 15, 1938, it was discovered that there were large numbers of the barnacle *Balanus improvisus* Darwin, living on the stems of the reeds in Horsey Mere, Norfolk. The water of Horsey Mere and Hickling Broad has been very saline since the sea broke through last spring on February 12, March 1 and April 4, and estimations of the salinity of the surface water on August 6, made by Mr. A. J. Rudd of the Norfolk Fishery Board, were: Horsey 18.19 per mille, Hickling varying from 21.0 per mille (north end) to 17.5 per mille (Whiteslea).

The fauna of the area is now an interesting mixture of brackish water and freshwater species. On August 2,