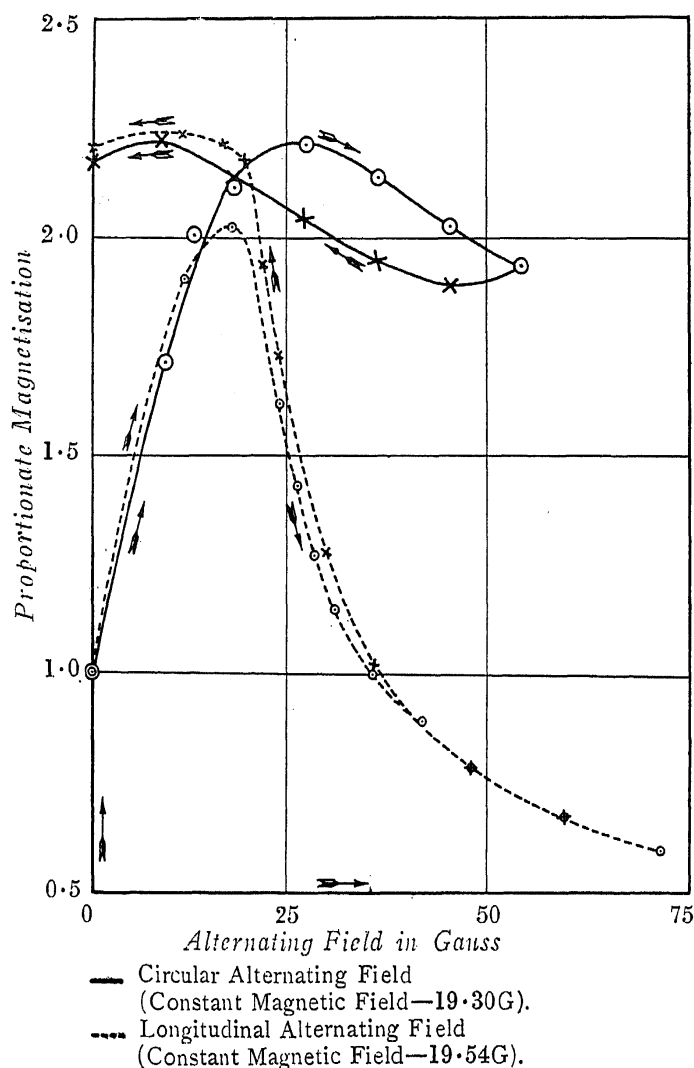


The Phenomenon of Negative Hysteresis in Nickel.

PROCOPIU¹ has studied the influence of an alternating circular or longitudinal field on the intensity of magnetisation of Iron and Steel in a constant magnetising field. The work has been extended to the case of Soft Iron and Nickel. The specimens in the form of wires were first put to a few complete magnetisation cycles in zero alternating field, and ultimately left in a weak magnetic field, so that the magnetisation had a small positive value. The alternating field was then gradually increased to a convenient value and then decreased subsequently. The longitudinal field was produced by passing an alternating current through a solenoid surrounding the specimen, and the circular alternating field, by passing an alternate current through the substance itself. The results for nickel are given in Fig. 1. The circular



alternating field refers to the field at the periphery of the wire and was calculated

according to the formula $H = \frac{2I}{10r}$, where 'I' is the strength of the alternating current, and 'r' the radius of the specimen.

The result in the case of Soft Iron is essentially the same as Procopiu's, with the difference that a slight hysteresis is noticeable even in the descending part of the curve, which was absent in Procopiu's work. In the case of Nickel in alternating longitudinal field, the effect is similar in nature to that in the case of Iron, but in the alternating circular field, the behaviour of Nickel is anomalous. The curve for decreasing alternating field goes below that for the increasing field and a loop is formed between the two curves, thus showing Negative hysteresis.

A similar effect of Negative hysteresis has been noticed by several workers² in the Magneto-Resistance change of Nickel and has been ascribed by Stierstadt³ to the previous magnetic treatment of the specimen, but its exact nature has not been understood as yet. It is significant that this Negative hysteresis appears only when a current passes through Nickel, as in the case of the alternating circular field and not in the case of the alternating longitudinal field, where no alternating current passes through the specimen. The occurrence of the effect in the Magneto-Resistance change, where again a current passes through the specimen, suggests that Negative hysteresis is connected with some aspect of the movement of conductivity electrons. The effect is no doubt real and an intensive study of the phenomenon is required for throwing light on this anomalous behaviour of Nickel.

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¹ S. Procopiu, *J. de Physique et le Radium*, 1930, 1, 365-72.

² Fr. Vilbig, *Arch. f. Electrotechnik*, 1929, 22, 194; Sen Gupta and Alam, *Ind. Jour. Phys.*, (8) 33, p. 9.

³ O. Stierstadt, *Phys. Rev.*, 1931, (2) 37, 1356.