

Printed magnetic needle probes sensor, embedding magnetic state monitoring

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The use of micro-magnetic non-destructive techniques has increased exponentially in the industrial field [1][2]. The Needle-probe technique of measuring local magnetic flux in electrical steel sheets has made its way into the non-destructive testing field over the past 70 years. In spite the earlier nature of this technique, there is still a meaningful lot of development to be done as per concerning its industrial implementation for an in-situ detailed monitoring of the magnetic behavior of some electric machines.

This situation paves the way for developing a pint-sized, embedded version of the needle probe sensors which comes forth to surpass the limits of the probe due to its size. The design is tailored around Printed Circuit board technique with the use of conductive ink (silver ink). A circuit is printed on a coated electrical steel sheet (40mm x 20mm x 0.3mm) while respecting a distance of 1 cm [3][4] between the two contact point with the materials. The routes are done as close as possible: 0.1mm distant from each other; so as to reduce losses due to air [5].

Given that the electrical steel sheets making up the laminated magnetic circuit of electric machines like transformers, AC/DC machines are coated, the sensor can be embedded into the magnetic circuit with no risk of conductivity, thus an idea of homogeneity state assured.

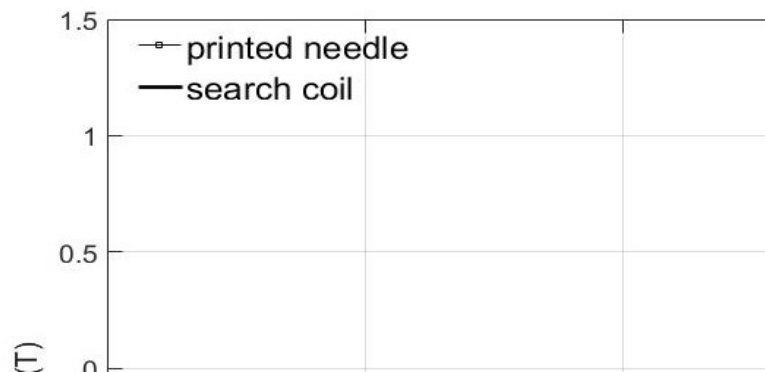


Figure 1: hysteresis loop when using printed needle and search coil.

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