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Dynamic Characterization of Nonlinear Magnets by Modeling and Measuring Magnetic Field Phase Spectrum

Magnetism and magnetic materials constitute a fascinating and challenging subject of investigation, playing a role in several branches of science and technology, as well as in advanced accelerators for subnuclear basic research. The theoretical description of ferromagnetic hysteresis and its rooting in the involved physical mechanisms exhibit several fundamental interpretative aspects, not yet completely understood. The physical understanding of magnetic materials properties always poses new challenges to scientists. Therefore, it is important to have the possibility of using measurement instrumentation capable of analyzing their characteristics. The target of this work is the dynamic characterization of ferromagnetic material magnets by analytical modeling and experimental measuring magnetic-field phase spectrum by a fully digital approach.
This work is composed by four parts. First, the proposed measurement method is shown by analytically modeling the dynamic nonlinearity in an hysteretic and a non-hysteretic component related to the magnetic field phase spectrum. This allows the dynamic behavior of the magnet to be characterized and its dynamic hysteretic transfer characteristic to be identified. In the third part, a set of digital simulation are realized, aimed at characterizing the measurement method and the proposed model by simuling a ferromagnetic material with a hysteretic dynamic behaviour. Then, performance of the proposed method is compared with traditional methods. In the fourth part, in reference to standard methods, the proposed model is validated and the measurement method is characterized experimentally.

BIBLIOGRAFIA

P. Arpaia, A. M. Da Cruz Serra, P. Da Ponte, C. Libano Monteiro “A critical note to IEEE 1057-94 standard on hysteretic ADC dynamic testing”, IEEE Transactions on Instrumentation and Measurement, Vol. 50, No. 4, August 2000.

P. Arpaia, C. Monteiro Libano, A. M. Da Cruz Serra “A Comprehensive Phase-Spectrum Approach to Metrological Characterization of Hysteretic ADCs”, IEEE Transactions on Instrumentation and Measurement, Vol. 51, No. 4, pp. 756 - 763, August, 2002 .

Author: Prof. ARPAIA, Pasquale (Università del Sannio)

Co-authors: Mr MASI, Alessandro (CERN); Mr ZANESCO, Antonio (Università del Sannio); Mr SPIEZIA, Giovanni (CERN)

Presenter: Prof. ARPAIA, Pasquale (Università del Sannio)

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