Measuring Magnetic Core Loss

Name(s) and Affiliation(s) of the Lecturer(s):

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Scope and Benefits:

This tutorial provides a broad overview of the methods and challenges of high frequency magnetic core loss measurement. This includes a survey of the various methods, their applicability to different core materials at multiple frequencies using various waveforms and outlining their strengths and weakness. The role of international standards to provide consist and quality data is highlighted. The concept of a data exchange format for use with an open source database of core loss data is introduced thus enabling the universal exchange of measurement data for the development of loss models for individual design, design software and AI endeavors.

Contents:

Accurate measurement of magnetic core loss of magnetic materials is critical to their effective use in magnetics design. This is especially true at high frequency under non-sinusoidal conditions. Knowledge of core loss at the design stage under the intended conditions reduces design time, prototype iterations and cost. Core losses tested under a wide range of conditions (temperature, waveform, excitation level, dc bias) can provide valid data sets for the using with artificial intelligence to enhance design software. This tutorial reviews the various methods developed and used to measure core losses under different conditions of waveforms and frequencies. It discusses some of the more subtle aspects such as sample size and shape, permittivity, power levels, fidelity of the driving waveforms, the accuracy of the equipment and calibration. The tutorial further describes the role of international standards, which can provide the basis for an open source database of core loss data where users can contribute and obtain core loss data of a known quality for their individual needs.

Schedule:

Schedule is as follows:

Monday, 5 September 2022 - 1st Tutorial Day - Afternoon

13:00 - 14:00	Lunch break (Optional – If ordered)
14:00 – 15:30	Introduction, Mechanisms of core loss
	Challenges of making accurate measurements
	Measuring methods, instruments and conditions
15:30 – 16:00	Coffee break
16:00 – 17:30	Measuring methods, instruments and conditions continued
	International standards
	Open source database of core loss data and data exchange format

Who should attend:

Practicing magnetics or power supply design engineers, material engineers or scientists, researchers and students in the power electronics will all benefit from this tutorial, which will deepen their understanding of magnetic core loss measurements techniques. They will be introduced to the open source database of core loss data which will be useful anyone designing or researching magnetics.

Technical Level:

Technical Level: Intermediate to advanced however beginners are welcome.

About the Lecturer:

George Slama George Slama has been designing and working with transformers and inductors over his entire career. His design experience covers everything from inductors small enough to pass through the eye of a needle to three phase control transformers and most types in between. His work has included quality control, automated production and testing plus manufacturing engineering management in Canada and the United States. Mr. Slama has worked in all aspects of switch mode power supply design and development. He has given design seminars at various conferences. Currently he is a senior application and content engineer at Würth Elektronik developing application notes, seminars and software tools to help engineers use magnetics effectively.