A Variable Inductors and Variable Analysis Transformers: Lighting Drivers Applications

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ABSTRACT:This paper provides a study of literature on Magnetically-controlled machines, variable and variable inductors Transformers, and their lighting gear applications. It identifies Fundamentals and basic concepts of operation of such instruments. Then, the study of particular techniques and circuits is based on Using the nature of a regulated inductance value, Covering recent discharge applications and solid-state lamp driver.

KEY WORDS: Saturation, Non-linear magnetics, Inductor, Transformer, Electric ballasts, LED lamps

INTRODUCTION

Variable Inductors and transformers of variables areInteresting instruments that have been used in a range of applications applications, some of which are concerned with power management and/or tuning Resonant Filters.With suitable core materials and the saturation can be modified by winding design techniques. Magnetic core level and obtain a current-controlled output apparatus. The control parameter received, or vector inductance, in lamp driver applications, it has been widely used.The writers have worked widely and have

New control techniques for fluorescent lamps have been developed (FL) for dimming and uniform service, electronic ballast and, in self-oscillating ballast, for CFLs, Circuits that guarantee power of flux and PFC[1].

It also outlines a number of methods that can be used an opportunity for new applications to be created, which new domains, resonant power converters, can cross over, Shift of inductive power, maximum monitoring of power points (MPPT), et cetera. Section II begins after this brief introduction, for a brief introduction to saturable-core reactors and along with other basic ideas, magnetic amplifiers the behavior of magnetic materials[2].

The underlying concepts of variable inductor and variable transformer operations are described while recalling the basic magnetism laws.They all typically refer to the unit, or the invention, as helpful or applicable industrially. Emphasis on magnetics in Section III Applications for controllers in lighting motors. Initial work is protected Latest controls, primarily related to the regulation of discharge lamps, FL and CFL techniques, and finally introduces the new solid-state lamp drivers, which also take advantage of the vector Inductance[3].

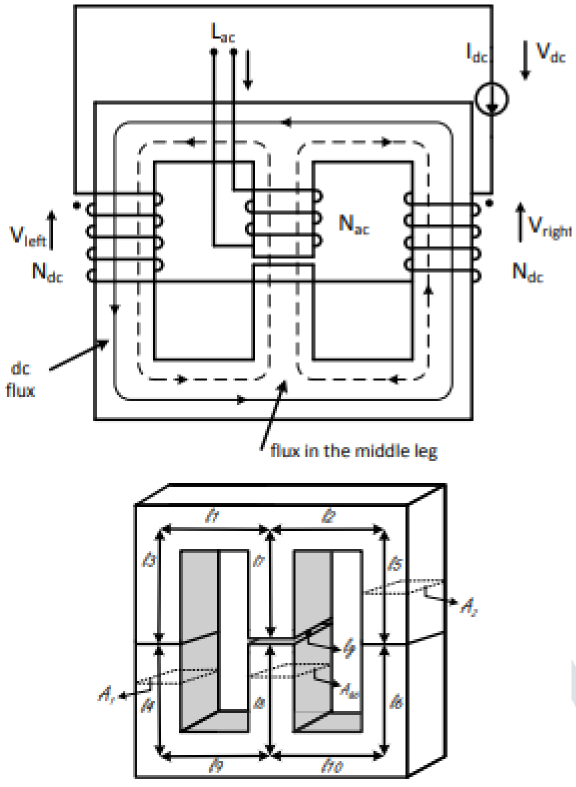

Fig. 1: Magnetic regulator: current-controlled variable inductor and core structure, double-E gapped core

Magnetic Regulators: Variable Inductors and Variable Transformers:

The density of magnetic flux or magnetic induction, B in a magnetic material depends on the magnetic mechanism. The material's strength, called permeability, μ, and the magnet Intensity of Area, H. The influence of any change in the density of flux the material B(H) curve can be found within the material[4].

$$B = \mu H = \mu r \mu 0$$

Where $\mu 0$ is the permeability of vacuum, a constant equal to $4\pi \times 10-7$ H/m, and μr is the relative permeability of the magnetic material, which is a dimensionless ratio, $\mu r = \mu\mu/0$. The value of μr for air and electrical conductors can be considered constant and equal to 1. For other materials, like ferromagnetic materials, μr is not constant but a non-linear function of H. Thus, the relationship between B and H for ferromagnetic materials is usually non-linear. An example of this magnetization curve can be observed in Fig. 1

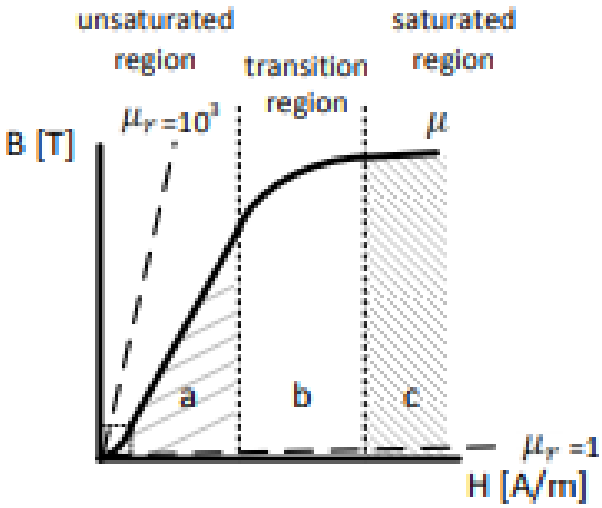

Fig. 2:Curve is characterized by three different regions

Taking Fig. 2 as reference, the (H) curve is characterized by three different regions: the unsaturated region, a, the transition region, also known as the knee of the curve, b, and The area that is saturated, c. A, for very low H values, in area a, due to the initial density, the flux density increases at a very slow rate. Inertia of the material's magnetic domains. After this initial stage, the flux density increases much faster in phase with increasing H and curve values exhibit an almost linear conduct[5]. The rate of increase in flux density in region b is drops until it eventually hits the saturation zone. In this one, All the magnetic domains in the saturated zone are orientated in the the same orientation. The vector of magnetization, M is defined as the moment of magnetic dipole per unit of volume, has reached its level up to optimum value. For this purpose, the slight rise indicated by the magnetization curve is only due to the μ0H term, as in (2). It is said that the material is magnetized to a full degree or extent saturated to be

$$\vec{B} = \mu 0(\vec{H} + \vec{M})$$

In type and characteristics, the magnetization curve varies different magnetic materials: some may have large or large smaller slopes; some might need a high H value to become only saturated. The behavior or reaction of the magnet chosen materials are key to the intended implementation of the magnetic equipment, saturable reactors or some kind of magnetic system supervisor[6].

When an increasing magnetic material is subjected to a before saturation is achieved, and then this field is reached, the magnetic field lowered gradually to zero and set in the opposite direction, the content does not comply until saturation is reached again, the original magnetization curve that followed the 1, 2 and 2 directions3. Instead, it follows the left side of the initial curve. This effect is shown in Fig. 2a. If this process is repeated until the cycle is completed, and again the magnetic field is set at its maximum positive value, a closed loop is obtained. This loop is called the hysteresis loop. The values $Bsat$ and –$Bsat$ correspond to the maximum positive and negative flux density. Brcorresponds to the residual flux density when the magnetic field H is set back to zero. $Hc$is called the coercive force and corresponds to the necessary value of H at which B is set back to zero[5].

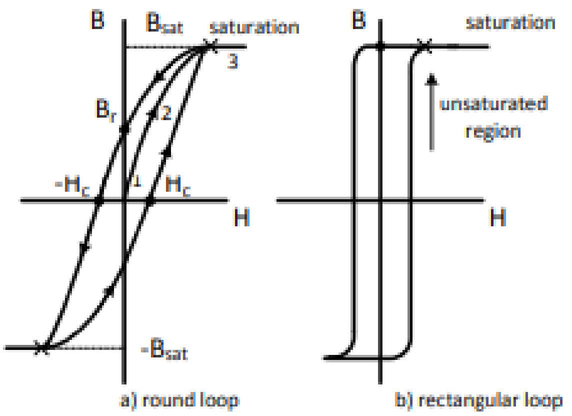

Fig 3: B-H Curve

Similar to the initial magnetization curve, the shape of the hysteresis loop is also material dependent. Soft magnetic materials are characterized by an easy change of the magnetic domains and consequently present a low coercive force and a narrower hysteresis loop. They are particularly selected for VI applications. Hard magnetic materials, also called permanent magnets, strongly resist to the influence of an external magnetic field and thereby the coercive force is much higher. The hysteresis loop is larger, and they also present a high value of residual flux. There are also some core materials with rectangular hysteresis loops, where $Bsat$ is reached for smaller values of H. These materials are particularly used in magnetic amplifiers or saturable reactors if a bi-stable operation is desired. This is the case where the reactor is simply used as an inductive switch. An example of this type of loop is presented.

CONCLUSION

This article discusses the state of the art of variable inductors especially when applied to lighting, variable transformers and Pilots. Drivers. The primary objective of this review is to assist with the future researchers were inclined to investigate these regulators and use them in converters of their own. A huge list of these applications regulators and general aspects relevant to the regulations are presented and the operating theory and design of devices are also addressed. In particular, it teaches researchers how to deal with various aspects by making use of an additional power, lamp control a parameter supplied by a current-controlled device that displays a device variable value of inductance.

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