Measuring System of Magnetostriction Under AC Excitation Using Optical Methods

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class variable inductor using orthogonal-core. Fig. 1 shows a schematic diagram of the core. Two c-cores are orthogonal in space. The core material is grain oriented silicon steel with the thickness of 0.23mm. The rating of the secondary output is 6.6kV-5A(33kVA). The third winding is for power supply to control circuit. The total weight of the core and windings is 154kg. As one trial, we made a partial gap in the contact surface interfacing primary and secondary cores in order to improve harmonic distortion of the secondary current. Fig. 2 shows the circuit of the 3-phase variable inductor using the orthogonal-cores. The secondary lagging reactive power varies with the primary dc current I_L controlled by the dc-dc converter. Test results demonstrated that 100kVar is controlled by the current I_L of 23A. The secondary line currents were almost sinusoidal. The whole loss including the control power was 5.3kW when 100kVar is controlled. The variable inductor developed here can be put to practical use for VAR compensation in the medium-voltage distribution system.


In order to achieve fuse-less protection and connector-less power transfer, a novel method of magnetic coupling in a high frequency ac power architecture is presented in this paper. Figure 1 shows the system diagram of the proposed hybrid architecture, which consists of a high frequency inverter, power distribution backplane and AC/DC converters. Each AC/DC converter consists of a transformer, a series resonant circuit, a diode bridge and an output filter. The series resonant circuit consists of a series inductor L_s and a series capacitor C_s. The series inductor is placed at the primary side of the transformer while the series capacitor is placed at the secondary side of the transformer. Further, the transformer is physically split into two halves - the primary side and the secondary side. The secondary side half transformer is physically part of the AC/DC converter. The series inductor is integrated with the primary side half transformer which is an integral part of the high frequency power distribution system. To verify the proof-of-concept of the proposed high frequency distribution system, a bread-board was designed which demonstrated the following characteristics of the proposed system: (i) limited power flow (less fire hazard), (ii) low no-load current (higher reduced-load efficiency and power factor), and (iii) limited short circuit current (fuse-less protection).

**EP-14. MEASURING SYSTEM OF MAGNETOSTRICTION UNDER AC EXCITATION USING OPTICAL METHODS.** T. Nakase, M. Nakano, F. Fujiiwara, and N. Takahashi (Okayama Univ., 3-1-1 Tsushima, Okayama 700, Japan)

It is fairly significant to measure magnetostriiction of silicon steel to develop a method for reducing acoustic noise of electrical machines, especially transformers. In this paper, the accuracy of measuring system of magnetostriiction under ac excitation using optical instruments, such as a laser Doppler vibrometer and a heterodyne displacement meter, is investigated. In order to avoid human errors, an automatic measuring system is