HT-08. Conducted CM Parasitic Parameter Modeling for PMSM Drive System Considering the Near-field Coupling. *X. Lu*[1], H. Lin[1] and J. Yan[1] *1. School of Electrical Engineering, Southeast University, Nanjing, Jiangsu, China*

The conducted common-mode (CM) electromagnetic interference (EMI) problems in permanent magnet synchronous motor (PMSM) have received numerous attentions for the increasing popularities of the motor in industrial applications [1]-[2]. The high frequency (HF) equivalent models of the motor have been established to reduce the EMI noise in the design stage [3]-[4]. However, the near-field coupling effect is commonly neglected in the conducted CM parasitic parameters modeling process, which leads to inaccuracy in frequency characteristics of the system EMI impedance. The propagation path of CM parasitic current in PMSM drive system is shown in Fig.1. The line impedance stabilizing network (LISN) is placed between the rectifier and the Grid to measure the conducted EMI noise. The conducted CM EMI noise, which is generated by the HF switching elements in pulse width modulation invertors, flows into the PMSM stator and couples through the parasitic capacity C_{SS} between the stator winding and the motor shield, which is connected to the earth wire, and then received by the 50 ohms resistance in LISN. Moreover, the parasitic capacitance C_{EH} between the switching elements and the heatsink provides the CM current another way back to the earth wire. The CM near-field coupling is combined with electric coupling and magnetic coupling. The CM equivalent circuit considering the near-field coupling is shown in Fig.2, where V_N is the equivalent noise source and the parasitic parameters of the circuit are also presented. The electric coupling is caused by the capacitive coupling between the circuit wire and the heatsink, denoted by C_{P1} and C_{P2}, and the magnetic coupling is due to the inductive coupling between the stator winding inductances L_{SA} and L_{SBC} and the cable parasitic inductances L_{PA} and L_{PBC}, denoted by the mutual inductances M_{PA} and M_{PBC}. The near-field coupling parameters are determined by the two-port network method, and the validity of the proposed model is proved by the comparison between the circuit simulations and experimental measurement results in the full paper.

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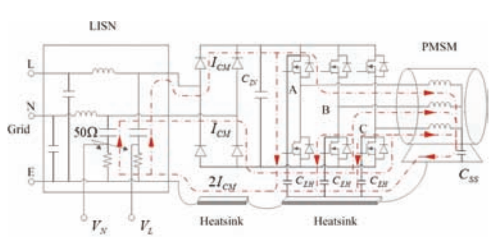

Fig.1 CM current propagation path in PMSM drive system

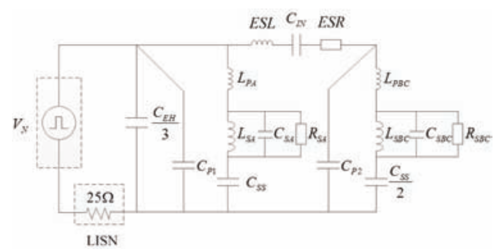

Fig.2 CM equivalent circuit considering the near-field coupling

HT-09. Design and numerical simulation of a magnetostrictive electric power generator. *G. La Rocca*[1], V. Franzitta[2], A. Viola[2] and M. Trapanese[1] *1. Dipartimento di Ingegneria Elettrica, Palermo University, Palermo, Italy; 2. Dipartimento dell'Energia, Palermo University, Palermo, Italy*

Recently Magnetostrictive technology has been proposed to be used in several energy harvesting technology [1]. In this kind of application, the working condition of the device is highly dynamic and non linear. As a result static models of magnetostrictive materials are usually not very accurate and can be not reliable to develop a sufficiently accurate design of the energy harvesting devices. In this paper we use Dynamic Preisach hysteresis model (DPM) for magnetostrictive materials operating in hysteretic and time varying nonlinear regimes to design and simulate a magnetostrictive electrical power generator. DPM is a development of classical Preisach Model which is able to include dynamical features in the mathematical model of hysteresis. The magnetostrictive material considered for the power generator is Terfenol-D. Its hysteresis is modeled by applying the DPM whose identification procedure is performed by using a neural network procedure previously publised [2,3]. The generator is supposed to be made of several square shaped floor tiles installed on intensively used floor. The tiles are designed to be mechanically loaded by ordinary walking persons and the pressure of each step generates a mechanical stress on the terfenol which is converted in a magnetic field variation that can be collected in order to produce an electromotive force (emf). The mathematical model used is able to simulate the time variation of the pressure, of the magnetization, of the magnetic field variation and the emf produced in each tile. The tiles, and therefore the generator, is activated from a large number of walking persons (ca. 1000). The gait used to simulate each persons is varied according to a normal distribution of the size of the walking population. The model is able to reconstruct both the magnetization relation and the Field-strain relation for each tile in the presence of the walking persons. and an electrical model of the connections of the tiles to the conversion system is able to simulate the electrical output parameters of the generator. Finally, it is shown that the power density of such a generator installed in a appropriately chosen area can be comparable to the power density of a photovoltaic generator.

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HT-10. Experimental Investigation of DC-Bias Related Core Losses in a Boost Inductor. *H. Kosai*[1,2], Z. Turgut[1,2] and J. Scofield[2] *1. UES Inc., Dayton, OH; 2. AFRL, Wright-Patterson AFB, OH*

Owing to their design requirements or unintentional interference, soft magnetic components in electronic systems are often subjected to dc bias-flux conditions. These dc bias conditions result in increased core losses, and have been shown to be independent of core material. The physical origin of these increased loss-