Calculating Impedance of a Common Mode Choke in High Frequency Regime

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Abstract

Common mode chokes are good EMI filters in electronic power systems [1]. For such devices, values for their impedance are critical to their performances as noise filters. In this study, a two-step finite element approach is employed to study the impedance variations of a ferrite-core common mode choke operating at high frequencies (0.1 to 10 MHz) [2]. Extraction of inter-winding parasitic capacitances via the electrostatic simulation was first carried out. Derived capacitance values were then used in a time-harmonic electromagnetic simulation via electric circuit and magnetic fields interfaces to calculate the impedance of the device in common mode. Simulation results reveal the peaking of impedance values over the calculated frequency range, signifying self-resonance behavior over this range [3].

Reference

1. T. Kut, A. Lucken, S. Dickmann, and D. Schulz, Adv. Radio Sci., vol. 12, pp. 143-148, 2014.
2. M. Kovačić, S. Stipetić, Z. Hanić and D. Žarko, IEEE Trans. on Electromagnetic Compatibility, vol. 57, no. 1, pp. 93-101, Feb. 2015.
3. http://www.coilws.com/index.php?main_page=page&id=128

Figures used in the abstract

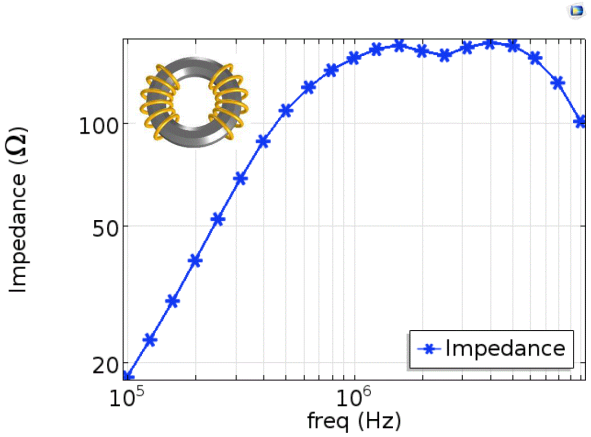

Figure 1: Calculated Impedance values of a Common Mode Choke exhibiting self-resonance behavior