Mutual inductance estimation for asymmetrical coupler with multiple transmit coils

Zulkifly Aziz[a], Mohd Mawardi Saari[a], Mohd Aufa Hadi Putera Zaini[a], Nurul A'in Nadzri[a], Chin Sim Yee[b]

[a]Faculty of Electrical Electronics Engineering Technology, Universiti Malaysia Pahang, Pekan Campus, Pekan, Pahang, 26600, Malaysia
[b]Faculty of Chemical and Process Engineering Technology, Universiti Malaysia Pahang, Pekan, Pahang, Malaysia

ABSTRACT

The standard method in calculating the mutual inductance is by using Neumann's formula which involves double integral and solution to elliptic integrals. This work examines the coil reactance approach when doing coil analysis by finite element method. The approach of magnetic vector potential is applied to an asymmetrical coupler with multiple transmitting coils and a miniature pickup coil. Rounded-tip ferrite cored receiver is used to improve coupling. Comparison with the experimental results showed the numerically computed values are within an acceptable range of ~5 %. The observed pairing effect between multiple transmit coils is confirmed with the experimental result which further validates this approach. The method discussed herein can be applied to design a wireless coupler to power multiple light emitters in a cylindrical photoreactor.

ACKNOWLEDGEMENT