SESSION 2.10 - SMART TECHNOLOGIES AND MODELLING FOR AVIONICS

Invited speech - RESONANT CIRCUITS FOR WIRELESS POWER TRANSFER AND POSSIBLE APPLICATION TO AVIONICS

The most important feature of an Inductive Wireless Power Transfer (I-WPT) is as high-power transmission efficiency. An Inductive Wireless Power Transfer system consists of two coupled inductors called primary and secondary where the primary side is usually constituted by a dc-ac resonant inverter which feed the primary inductor with a nearly sinusoidal current waveforms. This produces an alternative magnetic field. A part of this magnetic field, according to the coupling coefficient between the primary and secondary coils reaches the secondary coil and, therefore, an electromotive force is induced cross the secondary coil turns. A higher part of the magnetic field produced on the primary reaches the secondary, the higher is the voltage across the secondary coil terminals and, for any given load resistance, the higher is the output power delivered to the load.
The resonance is achieved by utilizing capacitors in combinations with the primary and secondary inductors. Since at the resonance the circulating reactive power is reduced, the transmission of real power over relatively large distances among the primary and secondary coils is achieved at increased efficiencies. Depending on the connection between the capacitors and coils, four main topologies can be identified: Series - Series, Series - Parallel, Parallel - Series, and Parallel - Parallel. In the following section, these resonance compensations schemes are analyzed, and the advantages and disadvantages of each topology are highlighted.
Possible application to avionics are proposed.

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