1. Record Nr. UNINA9910492147303321

Autore	Perez-Nicoli Pablo
Titolo	Inductive links for wireless power transfer : fundamental concepts for designing high-efficiency wireless power transfer links / / Pablo Perez-Nicoli, Fernando Silveira, Maysam Ghovanloo
Pubbl/distr/stampa	Cham, Switzerland : , : Springer, , [2021] ©2021
ISBN	3-030-65477-X
Descrizione fisica	1 online resource (230 pages)
Disciplina	621.319
Soggetti	Wireless power transmission Electric inductors
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Intro -- Preface -- Contents -- Acronyms -- 1 Introduction to Wireless Power Transfer -- 1.1 Why Wireless? -- 1.2 Wireless Links Classifications -- 1.3 Inductive Wireless Power Transfer -- 1.3.1 Transmitter DC-DC Converter -- 1.3.2 Inverter -- 1.3.3 Tx Matching Network -- 1.3.4 Inductive Link -- 1.3.5 Rx Matching Network -- 1.3.6 Rectifier -- 1.3.7 Receiver DC-DC Converter -- References -- 2 Inductive Link: Basic Theoretical Model -- 2.1 Reflected Load Theory in a 2-Coil Link -- 2.1.1 Underlying Physical Principles of Inductive Coupling: Self-Inductance (L), Mutual Inductance (M), and Coupling Coefficient (k) -- 2.1.2 Equivalent Circuit Model -- 2.1.3 Calculation of Link Efficiency, Link -- 2.1.4 Calculation of Power Delivered to the Rx-circuit, PMN -- 2.1.5 Effects of Coils' Quality Factor (Q) and Coupling Coefficient (k) on the Link -- 2.1.6 Effect of Tx and Rx Resonance on the Link -- 2.1.7 Frequency Splitting Effect -- 2.1.7.1 Analysis of Frequency Splitting Effect Based on T-Type Transformer Model -- 2.2 Reflected Load Theory in Systems with AdditionalResonant Coils -- 2.2.1 Link Efficiency, Link, and Power Delivered to the Rx-circuit, PMN, in a 3-Coil Link -- 2.2.2 Generalization to N-Coil Links -- 2.2.3 Link Efficiency, Link, and Power Delivered to the Rx-circuit, PMN, in a 4-Coil Link -- 2.3 Comparison Between 2-, 3-, and 4-Coil Links -- Appendices -- A.1 PMN Calculation for a Voltage Source and Series Tx

Resonance -- A.2 PMN Calculation for a Voltage Source and Parallel TxResonance -- A.3 PMN Calculation for a Current Source and Series Tx Resonance -- A.4 PMN Calculation for a Current Source and Parallel Tx Resonance -- References -- 3 Inductive Link: Practical Aspects -- 3.1 Coil Design -- 3.1.1 Square-Shaped Printed Spiral Coil -- 3.1.1.1 Self-Inductance, L -- 3.1.1.2 Equivalent Series Resistance(ESR). 3.1.1.3 Parasitic Capacitance, C -- 3.1.1.4 Mutual Inductance, M -- 3.1.1.5 Square-Shaped Printed Spiral Coil Example -- 3.2 Influence of Foreign Object -- 3.2.1 Effects of Conductive Materials -- 3.2.2 Effect of Ferrites -- 3.3 Safety and Electromagnetic Compatibility Considerations -- 3.3.1 Electromagnetic Compatibility(EMC) -- 3.3.2 Safety -- References -- 4 Back Telemetry -- 4.1 The Need for and Role of Back Telemetry in WPT Links -- 4.2 Design of Power Transfer Links that Need to Support Back Telemetry -- 4.3 Examples of Implementation -- 4.3.1 Load Shift Keying(LSK) -- 4.3.1.1 Example of Use in AIMDs -- 4.3.2 Frequency Shift Keying(FSK) -- 4.3.2.1 Example of Using FSK in Low-Frequency RFID -- References -- 5 Achieving the Optimum Operating Point(OOP) -- 5.1 Introduction -- 5.2 Maximum Efficiency Point(MEP) in 2-Coil Links -- 5.3 Maximum Power Point(MPP) in 2-Coil Links -- 5.3.1 MPP, Tx-circuit with a Voltage Source and a Series Resonant Capacitor -- 5.3.2 MPP, Tx-circuit with a Current Source and a Series Resonant Capacitor -- 5.4 Choosing Between MEP and MPP -- 5.5 MEP and MPP in N-Coil Links -- 5.6 Using Matching Networks to Achieve the OOP -- 5.7 Comparing 2-Coil and 3-Coil Links at the MEP -- 5.8 Design of a 3-Coil Link to Operate at the MEP -- Appendices -- B.1 Deduction of QLopt Which Maximizes Link -- B.2 Deduction of Linkmax -- B.3 Deduction of QLoptPMN (Voltage Source Tx with a Series Resonant Capacitor) -- B.4 Deduction of PMNmax (Voltage Source Tx with a Series Resonant Capacitor) -- B.5 Deduction of QLoptPMN (Current Tx Source with a Series Resonant Capacitor) -- B.6 Deduction of PMNmax (Current Tx Source with a Series Resonant Capacitor) -- B.7 Deduction of QLopt Which Maximizes Link in a 3-Coil Link -- B.8 Deduction of Linkmax (3-Coil) -- B.9 Deduction of QLoptPMN (3-Coil, Voltage Source, and a Series Resonant Tx).
B.10 Deduction of PMNmax (3-Coil, Voltage Source, and a Series Resonant Tx) -- References -- 6 Adaptive Circuits to Track the Optimum Operating Point(OOP) -- 6.1 Introduction -- 6.2 Using the Rx DC-DC Converter to Achieve the OOP -- 6.2.1 Switched-Inductor Converters -- 6.2.2 Switched-Capacitor Converters -- 6.3 Using an Active Rectifier to Achieve the OOP -- 6.3.1 Modifying the Control Signals -- 6.3.2 Reconfigurable Multiple-Gain Architectures -- 6.4 OOP Tracking in the AC Domain -- 6.4.1 Q-Modulation -- 6.4.2 Adaptive Matching Network -- 6.4.3 Reconfigurable Resonant Coil -- 6.5 Combining Adaptive and Nonadaptive Approaches to Achieve the OOP -- References -- 7 Closed-Loop WPT Links -- 7.1 Output Voltage Regulation -- 7.2 Tracking the Maximum Efficiency Point(MEP)in a Closed-Loop -- 7.3 The Joint Use of Output Voltage Regulation and MEP Tracking Feedbacks -- 7.4 Tracking the MEP in Links with Preregulated Output Voltage -- 7.5 Tracking the MEP in Links with Postregulated Output Voltage -- 7.5.1 Effect of Rx-circuit in the Operating Point -- 7.5.2 2-Coil Links -- 7.5.2.1 Analysis with Non-resonant Tx-circuit -- 7.5.3 3-Coil Links -- 7.5.4 N-Coil Links -- 7.5.5 Measurement Results -- 7.5.6 Concluding Remarks -- Appendices -- C.1 Deduction of (7.11) and (7.12) -- C.2 Deduction of (7.14) and (7.16) -- C.3 Proof of (7.19) -- C.4 Deduction of Table 7.6 -- References -- 8 System Design Examples -- 8.1 Radio Frequency Identification(RFID) -- 8.1.1 RFID Link Introduction -- 8.1.2 2-Coil RFID

Link -- 8.1.2.1 Charging Phase -- 8.1.2.2 Reading Phase -- 8.1.3 3-Coil RFID Link -- 8.1.3.1 Charging Phase -- 8.1.3.2 Reading Phase -- 8.2 Introduction to WPT Links for Visual Prosthesis -- 8.2.1 WPT Link for Visual Prostheses -- 8.2.2 Rx Matching Network Design: Series Versus Parallel -- 8.2.3 Tracking OOP Under Load Variations -- 8.3 Smartphones.
8.4 Electric Vehicles -- References -- Index.