What is the difference between unidirectional and bidirectional inductive power transfer?

Abstract: Unidirectional inductive power transfer systems allow loads to consume power, while bidirectional inductive power transfer (BIPT) systems are more suitable for loads requiring two-way power flow such as vehicle to grid applications with electric vehicles. Many attempts have been made to improve the performance of BIPT systems.

How to enable bidirectional power transfer in IPT systems?

However,in order to enable bidirectional power transfer in IPT systems,the use of bidirectional power convertersis essential. Specifically,a bidirectional AC-AC converter is essential in the primary side,as an interface between AC mains and the IPT system.

What are the advantages of inductive power transfer systems?

Inductive power transfer systems have many advantages towards wired solutions, such as the elimination of disturbing wires, the omission of open contacts and the simple overcoming of air gaps. Thus, this technology offers added value in a wide range of applications, for example:

What is inductive power transfer (IPT) technology?

Inductive power transfer (IPT) technology is a well-recognized technique for supplying power to a wide range of applications with no physical contacts. With the

What is inductive power transfer?

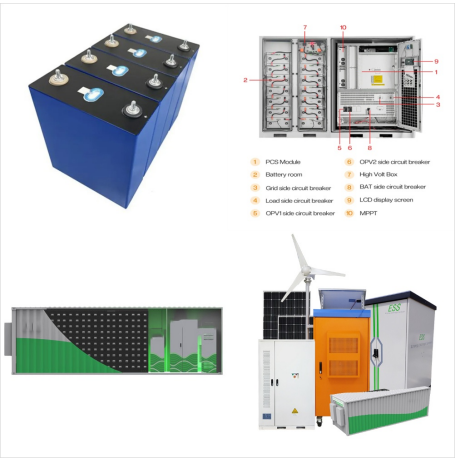
Inductive power transfer (also known as wireless power transfer) uses an electromagnetic field to transfer energy between two objects. This is usually done with a charging station. Energy is sent through an inductive coupling to an electrical device,which can then use that energy to charge batteries or run the device.

Do power converters affect the overall efficiency of BIPT systems?

In addition, a comprehensive study on the impact of power converters on the overall efficiency of the system is also presented. A closed-loop controller is proposed to optimize the overall efficiency of the BIPT system.

BIDIRECTIONAL INDUCTIVE POWER TRANSFER SYSTEMS

Abstract: Bi-directional Inductive Power Transfer (IPT) systems facilitate contactless power transfer between two sides and across an air-gap, through weak magnetic coupling. These systems constitute a 6th order resonant circuit and, as such, are difficult to design and control. A mathematical model which provides an insight into the behaviour of bi-directional IPT systems ???



A novel primary-side parameter estimation method for bidirectional inductive power transfer (BD-IPT) systems that can estimate mutual inductance at startup and monitor secondary-side phasor information continuously during operation is proposed. This letter proposes a novel primary-side parameter estimation method for bidirectional inductive power transfer (BD-IPT) ???

Inductive power transfer (IPT) is a well recognized technique through which power can be transferred from one system to another with no physical contacts. This paper presents a novel bidirectional IPT system, which is particularly suitable for applications such as plug-in electric vehicles (EVs) and vehicle-to-grid (V2G) systems, where two-way

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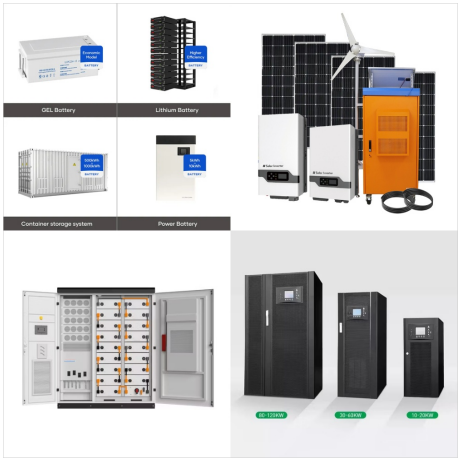
This paper proposes a new controller, which is based on power-frequency droop characteristics of IPT systems, to regulate its power flow in both directions without a dedicated communication link and shows that the proposed droop controller can successfully be used to regulate the two-way power flow. Inductive power transfer (IPT) technology is a well-recognized technique for ???



This paper presents a bidirectional wireless power transfer system for mobile power applications. A novel 2-switch bidirectional wireless power transfer system with dual-side control is proposed for mobile power applications. Although only two switches are adopted, the energy can be transferred from the transmitter side to the receiver side and vice versa. The term ???

Bidirectional Inductive Power Transfer System: Analysis and Control. M. Neath. Published 2013. Engineering, Physics. TLDR. This paper presents a meta-analyses of the foundations of ???

BIDIRECTIONAL INDUCTIVE POWER TRANSFER SYSTEMS

Bidirectional Inductive Power Transfer (IPT) systems are high order resonant circuits and require relatively sophisticated control strategies to regulate the power flow. The control of multi-pick-up IPT systems is more challenging as the order and complexity of the system increase with number of pick-ups. This paper proposes a new controller to regulate the ???

Inductive power transfer (IPT) systems facilitate contactless power transfer between two sides and across an air-gap, through weak magnetic coupling. However, IPT systems constitute a high order resonant circuit and, as such, are difficult to design and control. Aiming at the control problems for bidirectional IPT system, a neural networks based ???

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BIDIRECTIONAL INDUCTIVE POWER TRANSFER SYSTEMS

This study provides a detailed analysis of bidirectional inductive power transfer (IPT) systems using LCC-LCC compensation topology. It aims to contribute to the field by offering a unified framework that includes mathematical models for both time and frequency domains, accounting for the resistance of all passive components. This research introduces a concise ???

This manuscript proposed an optimal and unified triple phase shift (TPS) control strategy for some widely-used bidirectional inductive power transfer (BIPT) systems. The phase shift angles of the full-bridge converters at both the primary and secondary sides, as well as that between them, are developed and regulated dynamically to get zero-voltage switching (ZVS) ???

A triple-phase-shift (TPS) control strategy is proposed to achieve load matching while realizing zero voltage switching (ZVS) for all power switches within the entire power range and a peak efficiency of 94.83% is achieved. The efficiency of bidirectional inductive power transfer (BIPT) systems is strongly dependent on the load. Besides, the soft-switching ???

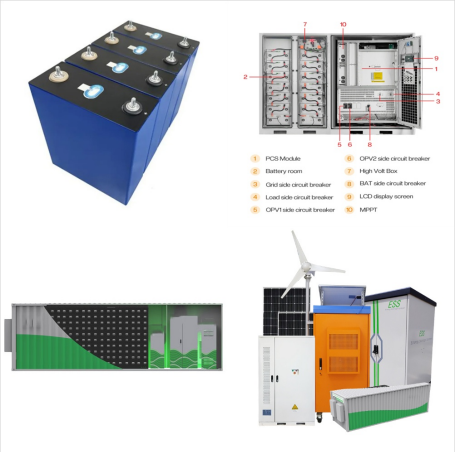
BIDIRECTIONAL INDUCTIVE POWER TRANSFER SYSTEMS

A multivariable dynamic model for a multipickup bidirectional IPT system is developed which can provide an accurate insight into the behavior of this system and can be used for controller synthesis under variations of component values. Inductive power transfer (IPT) systems are increasingly being used in numerous industrial applications, which essentially ???

A direct soft-switched single-phase ac-ac matrix converter (MC) for bidirectional inductive power transfer (IPT) systems is proposed. Quantum energy injection/regeneration principle is used to design a simplified digital power controller that enables the converter to establish bidirectional power transfer between the IPT system and single-phase ac mains at a ???

Power Transfer System (ICPT) is a advantageous method for applications which require bi-directional power transfer for analysis this paper will design bidirectional wireless inductive

BIDIRECTIONAL INDUCTIVE POWER TRANSFER SYSTEMS



It is the key to realize the precise control of power transfer direction and energy to ensure the synchronous phase shift of the bilateral converters in bidirectional inductive power transfer (BD-IPT) system. In order to solve the problem that wireless communication is adopted in bidirectional inductive power transfer system, and the delay caused by the power oscillation ???

Unidirectional inductive power transfer systems allow loads to consume power, while bidirectional inductive power transfer (BIPT) systems are more suitable for loads requiring two-way power flow such as vehicle to grid applications with electric vehicles. Many attempts have been made to improve the performance of BIPT systems. In a typical BIPT system, the output ???

Modern electronic systems and appliances are preferably powered through wireless techniques. Inductive power transfer (IPT) is an efficient technique that is suitable for supplying contactless or wireless power to numerous applications. IPT systems with the capability of bi-directional power flow are attractive for applications, such as vehicle-to-grid systems and ???

BIDIRECTIONAL INDUCTIVE POWER TRANSFER SYSTEMS

Bidirectional inductive power transfer (BIPT) systems for electric vehicles allow power exchange between grid and vehicle. To achieve high transfer efficiency under a wide range of transmission power, this article proposes a dual-side asymmetrical voltage-cancelation (AVC) control technique. With the proposed dual-side AVC control, the adjustment of the fundamental ???

The primary side of a typical bidirectional wireless power transfer (BD-WPT) system is grid integrated using a low-frequency ac-to-dc converter, which is connected to a high frequency dc-to-ac

A simplified digital power controller is used to design a direct soft-switched single-phase ac???ac matrix converter that enables the converter to establish bidirectional power transfer between the IPT system and single- phase ac mains at a desired power level. A direct soft-switched single-phase ac???ac matrix converter (MC) for bidirectional inductive power transfer (IPT) systems is ???

BIDIRECTIONAL INDUCTIVE POWER TRANSFER SYSTEMS

Wireless power transfer (WPT) is a promising technology for supplying power to various applications with no physical contacts. Recently, bidirectional WPT (BD-WPT) systems are gaining popularity for grid-to-vehicle and vehicle-to-grid applications which essentially require power transfer in both directions. However, BD-WPT systems are complex in nature, and ???

The human intervention free bidirectional efficient energy exchange between the grid and Electric Vehicles (EVs) relies on effective bidirectional power flow control in Wireless Power Transfer (WPT) system. This essential bidirectional control feature enables the grid to charge the EV's battery and, during surplus energy periods, allows the EV to feed power back to the grid. This ???

Inductive power transfer (IPT) is a well-established technology that allows power transfer from one system to another without any physical contacts. It offers numerous advantages such as ???

BIDIRECTIONAL INDUCTIVE POWER TRANSFER SYSTEMS

In order to guarantee a quick development of the EVs market, broad infrastructure is required to comfortably recharge their energy storage systems as fast as possible. Inductive power transfer (IPT) is an innovative approach for EV battery charging owing to the possibility of wireless supply, which prevents the use of electric cables to start

A Control strategy for efficiency optimization and wide ZVS operation range in bidirectional inductive power transfer system. IEEE Trans. Ind. Electron. 66(8), 5958???5969 (2019) Article Google Scholar Download references. Acknowledgment. This research is supported by The National Key Research and Development Program of China (2021YFB2501604).

Inductive Power Transfer (IPT) technology is gaining popularity as an efficient technique for supplying contactless power to numerous applications. In contrast to uni-directional IPT systems, bi-directional IPT systems invariably require more sophisticated and effective control strategy to regulate the power flow within the limits of power capability of converters. This ???

BIDIRECTIONAL INDUCTIVE POWER TRANSFER SYSTEMS

Unidirectional inductive power transfer systems allow loads to consume power, while bidirectional inductive power transfer (BIPT) systems are more suitable for loads requiring two-way power flow

Mutual inductance greatly impacts the performance of bidirectional inductive wireless power transfer (BD-WPT) systems, yet it is usually unknown due to the uncertain position of the coils or some environmental variations. To acquire the mutual inductance online, this paper proposes an online mutual inductance estimation method. This method constructs a virtual ???

The viability of the proposed bi-directional IPT concept is demonstrated with experimental evidence of a 500 W prototype bi-directional IPT system. Both experimental and simulations results are in good agreement, and indicate that the proposed IPT system is feasible and attractive for applications, where bi-directional power flow is advantageous.