

Soft switching is used to diminish the losses during the design of the converter, which can be further used in minimizing the output current ripples [65,66]. ... The power conversion took place because of controlling the voltage difference across the ...

High-power flywheel energy storage system (FESS) is widely considered as a potentially major energy storage system in the future. In order to improve the practicality and reduce high-power loss brought by high-power FESS in charging and discharging operation modes, a quasi-resonant zero voltage switching (QRZVS) bidirectional DC-DC converter for ...

is a critical energy storage element for the switching devices [2]. Similarly, the leakage inductance can be a part of a resonant impedance that enables soft switching [3], [4]. As such, the design of the series inductance must be carefully chosen as a set design value which is generally not minimized, but instead fixed to a desired design value.

Soft-switching is achieved in all switching elements through the wide operation range in both energy transfer directions. Reduced number of semiconductor devices as compared to the full-bridge boost converter (FSS-IFBBC) [24], and the same number of switches that in the dual inductor push-pull converter [25] and CF push-pull converter [26 ...

Demand for high-efficient isolated DC/DC converters to achieve energy transfer among renewable energy sources, energy storage elements, and loads is increasing because of renewable energies" increasing market penetration. ... Based on accurate boundaries, the most suitable optimization considering both soft-switching range and efficiency can ...

Resonant converters are soft switching; therefore, if the voltage across the switch is zero when it is turned on, it is ZVS. The switch will be referred to as ZCS if the current that flows across it is zero while it is in the OFF position. Figure 3 shows a switch's hard and soft-switching characteristics. Resonant converters transmit AC power ...

This paper presents a single-stage modular isolated soft-switching medium voltage string inverter (MVSI) with tri-port configuration to interconnect PV and storage to medium voltage (MV) grid. The modular MVSI provides advanced functionalities such as energy storage elements integration without additional converters, connection to MV grid resulting in lower distribution losses in the ...

With the rapid development of modern energy applications such as renewable energy, PV systems, electric vehicles, and smart grids, DC-DC converters have become the key component to meet strict industrial

demands. More advanced converters are effective in minimizing switching losses and providing an efficient energy conversion; nonetheless, the ...

The multiport dual active bridge is used to interface additional elements like batteries for storage; ... A series dual Buck-LLC resonant converter is proposed introducing auxiliary inductors which solves soft switching issue and optimize the energy transmission process also allows for adjusting the duty cycle of series dual buck circuits to ...

According to a single-stage interleaved software switching converter, power factor is controlled and battery charging and current are integrally controlled on the basis of a PFC circuit of a single-stage interleaving type so that efficiency of a charging device is enhanced and the cost is reduced. Further, it is possible to remove harmful electromagnetic radiation; enhance power ...

This paper proposes a high-frequency isolated current-fed dual active bridge bidirectional DC-DC series resonant converter with an inductive filter for energy storage applications, and a steady-state analysis of the converter is carried out. The performance of the proposed converter has been compared with a voltage-fed converter with a capacitive output ...

A new coupled inductor based soft-switching BDC is proposed that has a simple structure with no auxiliary switch and can provide soft- Switching conditions for both switches without additional control signals. For the battery super-capacitor hybrid energy storage system (BSHESS) applied to the electric vehicle (EV) or the hybrid electric vehicle (HEV), the ...

The bidirectional isolated AC/DC converter is widely used in the past decades. Most of the topologies are based on voltage source converter. However, the performance of the voltage source based converter is significantly limited by the bulky energy storage element, the range of soft switching, the leakage inductance of the transformer and so forth. A current fed ...

142 6 Soft-Switching Converters ·· · iD3 vD3 iCr2 vCr2 Signal(S2) Signal(S 1) i D1 vS1 iS2 vS2 iS1 v D1 t0 t1 t2 t3 t4 t5 t6 t7 t8 Mode1 Mode2 Mode3 Mode4 Mode5 Mode6 Mode7 Mode8 Mode9 t9 Mode10 t10 tdelay Vo Ii Vo Fig. 6.2 Magnetization key waveforms and switching performance When the bypass capacitor of S 1 is entirely discharged in this mode, the voltage ...

To improve the energy quality, most of the renewable energy systems include an energy storage element charged by the bidirectional DC-DC converter. This paper proposes the bidirectional DC-DC converter which employs the two bridge configuration resonant class-E converters on the both sides of the isolating transformer. ... transfer of power is ...

The control technique of this topology is the simplified logic-based control in order to achieve soft switching in response to load variation. The controller is designed in the energy injection/regeneration mode. ... Another

common strategy to adopt DC-link energy-storage elements within the circuit converter topology is to ensure grid-load ...

It is mainly caused by the diode conduction loss, since the output current is very large. For the magnetic elements (transformers and inductors), their power losses also take large share (12.6 + 14.7%). The share of switch losses is small due to the preferable soft-switching characteristics.

This paper presents a new topology for a fully bidirectional soft-switching solid state transformer (S4T). The minimal topology, featuring 12 main devices and a high-frequency transformer, does not use an intermediate DC voltage link, and provides sinusoidal input and output voltages. The S4T can be configured to interface with two-or multi-terminal DC, single ...

A new Soft-switching high gain DC-DC converter (SSHGC) is presented in this article. ... energy storage systems and DC micro-grids [1-3]. These conversion systems need high conversion ratios with large input currents to boost input voltages ranging from 12 to 48 V to desired output voltages ranging between 200 and 400 V. ... (ZVS) operation for ...

Generalized half-bridge and full-bridge resonant converter topologies with two, three and four energy storage elements are presented. All possible circuit topologies for such converters under voltage/current driven and voltage/current sinks are discussed. Many of these topologies have not been investigated in open literature. Based on their circuit element connections and source ...

Soft switching techniques could permit higher frequency operation, but most soft-switched converters do not maintain high performance across the wide voltage and power ranges required ... switching states includes an energy storage phase (SA1 and SB1 on), a direct delivery phase (SA1 and SB2 on), an indirect ...

Applications of soft switching Soft switching is used for various switched -mode power supplies. For switch-mode power supplies, it is important to reduce power loss to increase efficiency. In addition to the turn- off loss of switching devices, soft switching helps reduce transformer leakage inductance loss and diode recovery loss.

Owing to the energy depletion and environmental pollution, profitable renewable energy has aroused widespread public concerns. ... Analyse the high-order harmonics as and, the expressions of nth-order elements are deduced as (11) ... = 399.7 V and the voltage gain is calculated as 1.67. As seen, the soft-switching characteristics are also ...

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