Interleaved inductor energy storage

Does interleaved power factor corrected (PFC) reduce inductor area?
In these high power applications interleaving PFC stages can reduce inductor areaand reduce output capacitor ripple current. This is made possible through the inductor ripple current cancellation that occurs with interleaving. This application note reviews the design of a 350-W two phase interleaved power factor corrected (PFC) pre-regulator.

Why is inter-cell inductance important?
This means that the design of the inter-cell inductance allows tuning of the magnetising and leakage inductancesuch that each ripple current component can be attenuated to obtain an optimised performance (current ripple) while minimising the stress (extra loss because of switching ripple) and inductor size.

What is interleaved converter?
Interleaved converters with coupled inductors are widely used to share load current in high power applications. It offers high equivalent switching frequency and reduced output current ripples using small size magnetic components. Owing to smaller common-mode inductance,control system can be designed to achieve fast dynamic response.

What is the duty cycle of an inductor?
At low line the duty cycle (D1(?)) varies from 100% to 68%and at high line the duty cycle (D2(?)) varies from 100% down to 2%. The inductor ripple current cancellation will not be 100% throughout the line cycle. However,it is good enough to drastically reduce the input ripple current for a given inductance.

What is an interleaved boost converter?
The interleaved boost converter is simply two boost converters operating 180 degrees out of phase. The input current is the sum of the two inductor currents IL1 and IL2. Because the inductor's ripple currents are out of phase,they cancel each other out and reduce the input ripple current caused by the boost inductors.

What is the ratio of interleaved area product to a pre-regulator?
The ratio of the total interleaved area product (2 X WaAc INTERLEAVED) to the area product of a single stage pre-regulator is 0.5. This results in a 50% reduction in area product just by interleaving,which will result in a substantial reduction in boost magnetic volume.

This paper deals with a new soft-switched interleaved bidirectional DC-DC converter for energy storage systems. The conventional interleaved bidirectional converter incorporates with an additional auxiliary circuit to attain soft turn-on operation of the main switching devices (IGBTs). The proposed converter is operated in boost and buck modes with ...

The soft switching, current balancing, voltage balancing, and energy management control strategies of

interleaved three-level bidirectional DC-DC converter are investigated in the context of the supercapacitor energy storage system application. In this paper, firstly the process of soft switching is analyzed and the soft switching control strategy is ...

In this article, an interleaved coupled-inductor (CI) based bidirectional dc-dc converter (BDC) is proposed with a higher voltage conversion ratio (VCR). In this proposed interleave CI-based BDC (ICI-BDC), the CIs can operate as both a filter inductor and a transformer simultaneously, so that the power density is improved. Moreover, as a ...

study proposes eight-channel interleaved DC/DC converter for interfacing super-capacitor energy storage system to a 400 V DC voltage bus. Multi-stage interleaving magnetic circuit with two ...

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Two coupled inductors stored energy and reduced the current ripple in low-voltage side. Two coupled inductors are combined with the transformer can increase the voltage conversion ratio and achieve galvanic isolation. Additionally, the energy of the leakage inductance can be recycled into an active clamp capacitor to reduce voltage spikes on ...

Interleaved converters with coupled inductors are widely used to share load current in high power applications. It offers high equivalent switching frequency and reduced output current ripples ...

This paper proposes a soft-switched high-gain interleaved coupled inductor-based boost converter for renewable energy systems. The interleaved configuration, at the source side, reduces the current ripple of input and enhances the converter"s power capacity. At the output side, the voltage multiplier circuit increases the gain by means of coupled inductors ...

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In order to design the integrated magnetics based on inductor-current and output-current ripples, the concept of equivalent inductance is adopted to analyze the complex effects of negative and positive coupling. Within one switching cycle, a number of piece-wise linear inductances are defined with different switching intervals.

Magnetic integration of the inductors. For the two-phase interleaved LCL-type converter, the two energy-storage inductor L 1 and L 2 can be replaced by a single coupled inductor as aforementioned.

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