A Family Of Hybrid Boosting Voltage Converters

Tech ID: 30401 / UC Case 2015-147-0

BRIEF DESCRIPTION

Many industries, such as solar cells and energy storage, will be greatly benefited by high-gain step-up/step-down converters.UCI researchers have developed a family of hybrid boosting converters (HBC) that combine a base bipolar voltage multiplier (BVM) and one of several possible inductive switching cores to address various converter functionalities.

SUGGESTED USES

DC-DC voltage conversion applications such as renewable energy, high-voltage power sources, energy storage, and high-power conversion

FEATURES/BENEFITS

·Improved ConversionProperties: all HBC family members exhibit high gain, wide regulation range, low output ripple, easy expansion, low cost, and high-efficiency

·Variable Configuration: use of different inductive switching cores varies functionalities and available control strategies

·Extensions: configurations can be extended for bidirectional power delivery, DC-AC conversion, and DC micro-grid applications

TECHNOLOGY DESCRIPTION

DC-DC converters are an important category of power electronics which change DC electricity from one voltage to another.Step-up converters that increase voltage by 10x or more are particularly important for many applications, including renewable energy, high-voltage discharge (x-rays and discharge lamps), energy storage, and electrical power grids. Previously, inductor- or switched capacitor-based converters were used, but each has drawbacks.Inductor-based converters are bulky and have low gains while switched capacitor converters can be unstable and have many components.

UCI researchers have developed a family of hybrid boosting converters for high-gain applications.The invention integrates inductive switching cores of various functionalities and control strategies with a bipolar voltage multiplier (BVM) to produce Basic, Symmetrical, Isolated, and Tapped-inductor variants. The minimized component count, low component ratings, tunable voltage gain and expendable structure of proposed topologies provide solid candidates for low cost, small volume, high-gain, high-power and high-efficiency DC-DC converters.

STATE OF DEVELOPMENT

The family of hybrid boosting converters has been fabricated and characterized.

CONTACT

Ben Chu
ben.chu@uci.edu
tel: .

INVENTORS

» Smedley, Keyue M.

OTHER INFORMATION

CATEGORIZED AS

- » **Energy**
  - » Solar
  - » Storage/Battery
  - » Transmission
- » **Engineering**
  - » Other

RELATED CASES

2015-147-0

RELATED MATERIALS

» Wu, Bin, et al. “A New Hybrid Boosting Converter for Renewable Energy Applications.” IEEE Transactions on Power Electronics, vol. 31, no. 2, 2016, pp. 1203–1215., doi:10.1109/tpel.2015.2420994. - 04/08/2015

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	10,199,935	02/05/2019	2015-147

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Floating-Non Contact Wireless Voltage Sensor For High-Voltage Transmission Lines
- A Family Of Two-Switch Boosting Switched-Capacitor Converters (TBSC)
- Cost-Effective Micro-Inverter For Solar Power Generation
- New Bootstrap Gate Drivers For Multilevel Converters

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5270 California Avenue / Irvine,CA
92697-7700 / Tel: 949.824.2683