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A New High Step-Up DC-DC Converter for Photovoltaic Application: Switch Inductor Cell Combined with Voltage Doubler Circuit

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Abstract
A new model of switch inductor (SL) combined with a voltage doubler-employed DC-DC step-up converter has been developed here to get optimum output from the solar photovoltaic cell. The voltage transformation ratio of the proposed circuit is almost six times higher than the input voltage. The high step-up ratio is obtained without worsening the transformation efficiency of the converter. The functionality of the suggested configuration has been compared with current, advanced DC-DC converters incorporated with a PV source. The proposed design performs better than existing designs regarding voltage gain and efficiency. Maximum Power Point Tracking (MPPT), an approach that relies on the Perturb and Observe (P&O) algorithm, has been used to ensure the optimum performance attainable from Photovoltaic panels. The employment of MPPT controllers does not deteriorate the performance of the proposed design; instead, 96% conversion efficiency has been achieved. Simulation of the proposed and existing topology have been carried out in PSIM and Simulink environments. © 2022 IEEE.

Author Keywords
MPPT; Step up converter; Switch Inductor Cell (SL); Voltage Doubler Circuit (VDC)

Index Keywords
Conversion efficiency, Electric inductors, Maximum power point trackers, Photoelectrochemical cells, Solar panels, Solar power generation, Timing circuits; High step-ups, Maximum Power Point Tracking, New high, Photovoltaic applications, Solar photovoltaics, Step-up converter, Switch inductor cell (SL), Voltage doubler, Voltage doubler circuit, Voltage transformation; Boost converter

References

- Hossain, M.B., Islam, M.R., Muttaqi, K.M., Sutanto, D., Agalgaonkar, A.P.
(2022) *A Novel Strategy for Fast Fluctuations Compensation of PV Powered Grid-Interactive Microgrid*, pp. 810-816.
- Nathan, K., Ghosh, S., Siwakoti, Y., Long, T.
A New DC-DC Converter for Photovoltaic Systems: Coupled-Inductors Combined Cuk-SEPIC Converter
(2019) *IEEE Trans. Energy Convers*, 34 (1), pp. 191-201.
- Carrasco, J.M.
Power-electronic systems for the grid integration of renewable energy sources: A survey
(2006) *IEEE Trans. Ind. Electron*, 53 (4), pp. 1002-1016.
- Walker, G.R., Sernia, P.C.
Cascaded DC-DC converter connection of photovoltaic modules
(2004) *IEEE Trans. Power Electron*, 19 (4), pp. 1130-1139.
- Meneses, D., Blaabjerg, F., Garcia, O., Cobos, J.A.
Review and Comparison of Step-Up Transformerless
(2013) *IEEE Trans. Power Electron*, 28 (6), pp. 2649-2663.
- Forouzesh, M., Siwakoti, Y.P., Gorji, S.A., Blaabjerg, F., Lehman, B.
Step-Up DC-DC converters: A comprehensive review of voltage-boosting techniques, topologies, and applications
(2017) *IEEE Trans. Power Electron*, 32 (12), pp. 9143-9178.

- Forouzesh, M., Shen, Y., Yari, K., Siwakoti, Y.P., Blaabjerg, F.
High-Efficiency High Step-Up DC-DC Converter with Dual Coupled Inductors for Grid-Connected Photovoltaic Systems
(2018) *IEEE Trans. Power Electron*, 33 (7), pp. 5967-5982.

- Inverters, T.G.T., Das, M., Member, S., Pal, M., Agarwal, V.
(2019) *Novel High Gain , High Efficiency DC-DC Converter Suitable for Solar PV Module Integration with*, pp. 1-10.

- Khan, M.Y.A., Liu, H., Habib, S., Khan, D., Yuan, X.
Design and Performance Evaluation of a Step-Up DC-DC Converter with Dual Loop Controllers for Two Stages Grid Connected PV Inverter
(2022) *Sustain*, 14 (2).

- Kummara, V.G.R.
(2020) *A Comprehensive Review of*, 9 (1).
DC-DC converter topologies and modulation strategies with recent advances in solar photovoltaic systems

- Muranda, C., Ozsoy, E., Padmanaban, S., Bhaskar, M.S., Fedak, V., Ramachandaramurthy, V.K.
Modified SEPIC DC-To-DC boost converter with high output-gain configuration for renewable applications
(2017) *2017 IEEE Conf. Energy Conversion, CENCON 2017, L. 2018-Janua*, pp. 317-322.

- Sanjeevikumar, P., Bhaskar, M.S., Dhond, P., Blaabjerg, F., Pecht, M.
Nonisolated sextuple output hybrid triad converter configurations for high step-up renewable energy applications
(2017) *Lect. Notes Electr. Eng*, 436, pp. 1-12.

- Zhang, G.
An Impedance Network Boost Converter with a High-Voltage Gain
(2017) *IEEE Trans. Power Electron*, 32 (9), pp. 6661-6665.

- Zaid, M., Malick, I.H., Ashraf, I., Tariq, M., Alamri, B., Rodrigues, E.M.G.
(2022) *A Nonisolated Transformerless High-Gain DC-DC Converter for Renewable Energy Applications*,

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