

Curriculum Vitae

SUN Chuan

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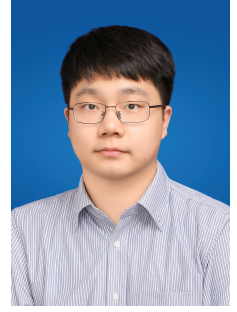
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📄 **ResearchGate:** https://www.researchgate.net/profile/Chuan_Sun8

📖 **Google Scholar:** <https://scholar.google.com/citations?user=HqYtgXwAAAAJ&hl=en>



Education

- 2019.09 - 2023.09 ◇ **Ph.D. in Power Electronics, The Hong Kong Polytechnic University (PolyU), Hong Kong SAR, China.**
Research Area: Advanced Modulation and Control Strategies for DC-DC Converters.
Thesis Title: Optimized Transient Modulation and Control Strategies for Bidirectional Dual-Active-Bridge DC-DC Converters.
Supervisor: Dr. LOO Ka-Hong, Associate Professor of Department of Electrical and Electronic Engineering, Assistant Dean of Faculty of Engineering.
- 2015.09 - 2017.08 ◇ **M.Sc. in Information Technology, The Macau University of Science and Technology (M.U.S.T.), Macau SAR, China.**
Research Area: High-Frequency Converter Topology, Control and Applications.
Thesis Title: Optimized Modulation Strategies for Fast Transient Response in Dual-Active-Bridge DC-DC Converter.
Supervisor: Prof. Xiaodong Li, Assistant Dean of Faculty of Innovation Engineering, Program Director of School of Computer Science and Engineering.
- 2011.09 - 2015.07 ◇ **B.Eng. in Electronic and Information Engineering, North University of China (NUC), Taiyuan, China.**

Employment

- 2024 - Present ◇ **Assistant Professor**
Department of Engineering Science and Faculty of Innovation Engineering
Macau University of Science and Technology
Research Areas: 1) Topology, modeling, modulation, and control techniques of resonant converters; 2) AC/DC hybrid multi-port power router; 3) wireless power transfer technology; 4) power supplies for special industrial environments; 5) bi-directional energy storage inverters.
- 2023 - 2024 ◇ **Assistant Research Fellow and Research Associate**
College of Electrical Engineering, Sichuan University
- 2017 - 2018 ◇ **Power Electronics Engineer**
Hangzhou Livoltek Power Co., Ltd.

Up to now, as the first or corresponding author, Dr. Sun published 6 SCI journal papers (including 3 top-tier journal papers) and 2 EI conference papers. As the first inventor, Dr. Sun holds 1 U.S. Patent and 1 Australia Innovation Patent, respectively. As a co-author, Dr. Sun published 13 SCI journal papers and 2 EI conference papers. Currently, he has also prepared several papers to be submitted to IEEE trans journals.

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- [2] Sun, C., Jiang, X., Cao, L., Loo, K. H., 'Total suppression of high-frequency transient oscillations in dual-active-bridge series-resonant converter by trajectory-switching modulation,' *IEEE Transactions on Power Electronics*, vol. 37, no. 6, pp. 6511–6529, 2022, **Top Journal**, SCI (JCR Q1), IF=6.7.
- [3] Sun, C., Liu, J., Jiang, X., 'Generalized multiphase-shift transient modulation for dual-active-bridge series-resonant converter,' *IEEE Transactions on Power Electronics*, vol. 38, no. 7, pp. 8291–8309, 2023, **Top Journal**, SCI (JCR Q1), IF=6.7.
- [4] Sun, C., Li, X., 'Fast transient modulation for a step load change in a dual-active-bridge converter with extended-phase-shift control,' *Energies*, vol. 11, no. 6, p. 1569, 2018, SCI (JCR Q3), IF=3.2.
- [5] Sun, C., Li, X., Zhou, S.-Z., 'Transient current control for a step load change in a dual-active-bridge converter,' *Electronics Letters*, vol. 54, no. 22, pp. 1290–1292, 2018, SCI (JCR Q4), IF=1.1.
- [6] Hu, S., Sun, C., Ding, R., Li, X., 'Sinusoidal-ripple-current charging modulation for semi-dual-active-bridge ac-dc converter with full soft switching and power factor correction,' *IEEE Transactions on Circuits and Systems II: Express Briefs*, vol. 71, no. 1, pp. 326–330, 2024, **Corresponding Author**, SCI (JCR Q2), IF=4.4.
- [7] Sun, C., Li, X., 'Instantaneous current balance modulation for fast transient response in a dual-active-bridge converter,' in *2018 IEEE International Power Electronics and Application Conference and Exposition (PEAC)*, EI Conference Paper, IEEE, 2018, pp. 1–6.
- [8] Sun, C., Chen, G., Chen, X., Loo, K.-H., Hu, S., Li, X., 'A six-degree-of-freedom trajectory-switching modulation framework for triple-phase-shift-modulated dual-active-bridge converters,' in *The 10th International Power Electronics and Motion Control Conference-ECCE Asia (IPEMC 2024-ECCE Asia)*, EI Conference Paper, IEEE, 2024, pp. 1–6.
- [9] Sun, C., Li, X., *System and method for controlling a converter circuit*, US Patent No.:10,658,936 B2, May 2020.
- [10] Sun, C., Li, X., *System and method for controlling a converter circuit*, Australian Innovation Patent No.:2017100494, May 2017.
- [11] Liu, J., Wong, C. S., Sun, C., Xu, F., Jiang, X., Loo, K. H., 'Software-reconfigurable multistage constant current wireless battery charging based on multiharmonic power transmission,' *IEEE Transactions on Power Electronics*, vol. 38, no. 4, pp. 5586–5597, 2023, Top Journal, SCI (JCR Q1), IF=6.7.
- [12] Jiang, X., Sun, C., Cao, L., Liu, J., Law, N.-F., Loo, K., 'Peer-to-peer energy trading in energy local area network considering decentralized energy routing,' *Sustainable Energy, Grids and Networks*, p. 100 994, 2023, SCI (JCR Q1), IF=5.4, ISSN: 2352-4677.

- [13] Jiang, X., **Sun, C.**, Cao, L., Liu, J., Law, N.-F., Loo, K., ‘Decentralized local energy trading with cooperative energy routing in energy local area network,’ *International Journal of Electrical Power & Energy Systems*, vol. 152, p. 109 209, 2023, SCI (JCR Q1), IF=5.2, ISSN: 0142-0615.
- [14] Li, Y., Wang, R., Zhong, L., ‘Analysis and design of a high-frequency isolated dual-transformer dc-dc resonant converter,’ *Electronics*, vol. 12, no. 1, 2023, SCI (JCR Q3), IF=2.9, ISSN: 2079-9292.
- [15] Liu, J., Xu, F., **Sun, C.**, Loo, K. H., ‘A compact single-phase ac-dc wireless power transfer converter with active power factor correction,’ *IEEE Transactions on Industrial Electronics*, vol. 70, no. 4, pp. 3685–3696, 2023, Top Journal, SCI (JCR Q1), IF=7.7.
- [16] Liu, J., Xu, F., **Sun, C.**, Loo, K. H., ‘A soft-switched power-factor-corrected single-phase bidirectional ac-dc wireless power transfer converter with an integrated power stage,’ *IEEE Transactions on Power Electronics*, vol. 37, no. 8, pp. 10 029–10 044, 2022, Top Journal, SCI (JCR Q1), IF=6.7.
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- [18] Jiang, X., **Sun, C.**, Cao, L., Ngai-Fong, L., Loo, K. H., ‘Peer-to-peer energy trading with energy path conflict management in energy local area network,’ *IEEE Transactions on Smart Grid*, vol. 13, no. 3, pp. 2269–2278, 2022, Top Journal, SCI (JCR Q1), IF=9.6.
- [19] Tang, Y., Li, X., Zhou, S.-Z., **Sun, C.**, Chen, G., ‘Comprehensive study of fast load modulation with volt-second balance in a dual-active-bridge converter,’ *IET Power Electronics*, vol. 12, no. 6, pp. 1357–1367, 2019, SCI (JCR Q3), IF=2.0.
- [20] Zhang, Y., Li, X., **Sun, C.**, He, Z., ‘Improved step load response of a dual-active-bridge dc-dc converter,’ *Electronics*, vol. 7, no. 9, p. 185, 2018, SCI (JCR Q3), IF=2.9.
- [21] Wang, R., Li, Y., **Sun, C.**, ‘Analysis and verification of a half-dual bridge resonant converter with voltage match modulation,’ *Electronics*, vol. 11, no. 17, p. 2675, 2022, SCI (JCR Q3), IF=2.9.
- [22] Li, X., Hu, S., **Sun, C.**, Zhang, Y.-F., ‘Asymmetric-double-sided modulation for fast load transition in a semi-dual-active-bridge converter,’ *IET Power Electronics*, vol. 10, no. 13, pp. 1698–1704, 2017, SCI (JCR Q3), IF=2.0.
- [23] Lin, S.-T., Li, X., **Sun, C.**, Tang, Y., ‘Fast transient control for power adjustment in a dual-active-bridge converter,’ *Electronics Letters*, vol. 53, no. 16, pp. 1130–1132, 2017, SCI (JCR Q4), IF=1.1.
- [24] Jiang, X., **Sun, C.**, Cao, L., Law, N.-F., Loo, K. H., ‘Review and comparative study of energy routing algorithms for energy internet,’ in *2021 IEEE 5th Conference on Energy Internet and Energy System Integration (EI2)*, EI Conference Paper, 2021, pp. 567–572.
- [25] Zhou, S.-Z., **Sun, C.**, Hu, S., Chen, G., Li, X., ‘Improved load transient response of a dual-active-bridge converter,’ in *2018 International Power Electronics Conference (IPEC-Niigata 2018-ECCE Asia)*, EI Conference Paper, IEEE, 2018, pp. 370–374.

A Research

◇ **Introduction to Achievements:**

Dual-active-bridge (DAB) DC-DC converters have a wide range of applications in emerging power electronics scenarios, e.g., energy storage systems. In order to improve the dynamic performance of DAB converters, most existing research only focuses on developing more advanced control technologies, but largely ignores the impact of transient phase-shift modulation on the closed-loop-controlled converter system. Dr. Sun has been dedicated to researching how to improve the dynamic performance of DAB converters for a long time. In the authoritative academic journal TPEL in the field of power electronics, he was one of the first researchers to propose sensorless transient trajectory modulation strategies to completely suppress high-frequency oscillations and DC offsets in the waveform; he originated the new idea and method of "co-optimization of control and modulation" to DAB converters, which simultaneously optimized the PWM generator and model-predictive controller, effectively eliminating the transient DC offsets in transformers and inductors, and further accelerating the system's response speed, truly achieving the optimal dynamic response. These studies can minimize the transient current stress and settling time of DAB converters during load changes, greatly improving the stability and safety of equipment operation, and having significant academic and engineering values.

◇ **Research Interests:**

Advanced Power Electronic Conversion and Control Techniques

With the proposal of the national "dual carbon" goals, industries related to new energy have entered a period of rapid development. Power electronics technology is a key supporting technology for achieving safe, stable, efficient, and flexible operation of new-energy resources. Although researchers have conducted some research on new-energy generation and distribution systems, existing electric energy conversion systems still lack sufficient conversion efficiency, control flexibility, and intelligence. Based on academic and engineering experience in related fields, I will continue to devote myself to researching novel control and modulation technologies to overcome the performance bottlenecks of existing power converters, and carry out industry university research cooperation to develop the next generation of high-end intelligent power equipment with advantages in conversion efficiency, power density, power quality, control performance, and other aspects.




Project Experience

- 2017 - 2019 ◇ **Transient Modulation of a Dual-Active-Bridge Converter under Multiple Phase-Shift Control**
Supported by Science and Technology Development Fund (FDCT) of Macau (No. 060/2017/A).
As the first student participant.
Responsibilities: Theoretical derivation, simulation verification, hardware design, PCB layout, and implementation of digital control algorithm using DSP.
- 2017 - 2024 ◇ **A 35kW Pulse Plating Reverse Rectifier, A 5.5kW Bidirectional Energy Storage Solar Inverter, A 3kW Linear Current Controlled Current Source, etc.**
Enterprise Projects.
As a R&D director or key participant.
Responsibilities: DSP-based multiple-loop digital control design, embedded software debugging, simulation verification, and hardware tests.

Prizes and Scholarships

- 2017
 - ◇ **Second-Class Excellent Research Award**
Macau University of Science and Technology, Macau, China.
 - ◇ **South China Division Team First Prize**
The 12th China Graduate Electronics Design Contest, China.
- 2016
 - ◇ **National Finals Individual Third Prize (Chuan Sun)**
National Finals Team Second Prize
The 11th China Graduate Electronics Design Contest, China.
- 2013
 - ◇ **The Second Prize of Shanxi Province**
National Undergraduate Electronics Design Contest, China.
 - ◇ **Excellent League Member**
 - ◇ **Second Grade Scholarship**
North University of China, Taiyuan, China.

Membership of Professional Bodies

- ◇ **Member**, Institute of Electrical and Electronics Engineers (**IEEE**) 
- ◇ **Member**, The IEEE Power Electronics Society (**IEEE PELS**) 
- ◇ **Member**, China Power Supply Society (**CPSS**) 
- ◇ Dr. Sun serves as a reviewer for various international SCI journals, e.g., IEEE Transactions on Power Electronics, IEEE Transactions on Industrial Electronics, IEEE Transactions on Transportation Electrification, IEEE Journal of Emerging and Selected Topics in Power Electronics, and IET Power Electronics.