



Editorial

Foreword—Transactions of the Power Electronics Community

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1. PERA Transactions—The Journal of the Power Electronics Community

It is my honor to preface the new journal, *Power Electronics Research and Applications Transactions* (abbreviated as *PERA Transactions*, or *PERAT*), and to welcome all readers cordially.

I thank the scholars who enthusiastically responded to our first Call for Papers for the inaugural number. Among them are ten IEEE Fellows, one ASME Fellow, and one IEICE Fellow, including one past President of an IEEE Society and three past Editors-in-Chief of IEEE journals, two present Co-Editors-in-Chief of an IEEE Transactions journal, and many other known professors in power electronics from different countries, who also serve as Associate Editors for other publications in the field.

The first declarative goal of PERA Transactions is to be a leading power electronics journal in the world; to be the primary choice of power electronics scholars for publishing their fundamental or applied research papers, and of company engineers for publishing articles describing their advanced industrial applications. The second goal is to become the main discussion forum in the power electronics community, where people from academia and industry, authors and readers, can exchange their ideas, discuss breakthroughs in the field, try to foresee future developments.

Each word in the title refers to a sub-goal of our new publication. ‘Power Electronics Research’ because our journal focuses on articles dealing with research in any classical or modern field of power electronics. Both fundamental and applied research are welcome. Theoretical results whose applications may come only years later and results that can be useful immediately in industry are both sought. Papers that open new ways and provoke new ideas are much liked. Research topics include, but are not limited to, low- and high-power conversion circuits; their design, modeling, analysis, simulation, control, implementation; electromagnetic and thermal considerations; EMI and EMC in the context of testing electronic components and consumer goods; reliability, fault tolerance, and efficiency. Emerging technological applications of power electronics in smart grid and microgrids, electrical systems supplied by green energy sources, electric vehicles, electrical aircraft and ships, energy storage, wireless power transfer, lightning, cyber-physical systems, microprocessors and data centers, switched-capacitor-based circuits, consumer electronics, medical applications, or artificial intelligence-based systems will find a good place in the journal. Original power electronics education papers could also be considered for publication.

The words “and Applications” refer to the editorial willingness to publish articles coming from industry, in which company engineers describe novel, interesting designs or new applications of known circuits. Applications in motor drives, UPS, wind energy systems, transportation, household appliances, large integrated systems, data centers, satellites, spacecraft and launch vehicles, and many others are suitable subjects.

A special, large space will be assigned to the review papers. Such a paper can be extremely useful for making a point on the research advances in a given subject at a certain time. It is more than a survey of published articles on a certain subject. A timely review paper shows the current thinking on the respective subject. It has to be an original intellectual work by presenting a critical personal point of view in classifying and comparing the available results. By showing where the field is going, pointing out the limits of the available methods/circuits, and giving the authors’ perspective regarding future developments of the topic, a review paper plays an important role in stimulating further ideas and developments.



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The word “Transactions” was preferred over the word “journal” in the title. If in a restrictive sense, “transactions” refer to the proceedings of a learned society, more generally, they can be viewed as the written proceedings of a scientific community. And this is exactly one of our publication goals: to be the main forum for written discussions in the power electronics community. Each issue will have a few reserved pages, where the readers can express their opinions about a published paper. The readers can share their criticisms or even contrary ideas. The authors or the editor in charge of that paper will reply. It is envisioned that such a change of ideas will open the way for broader discussions in which more readers express their views. As the published papers will come from different subfields of power electronics, including emerging ones, the publication will become a mirror of what is going on in power electronics.

To enhance the participation of the power electronics community, an annual competition for the best papers will begin after two years of continuous publication. Specifically, the votes will be given by the papers’ readers. The publisher will contribute by providing financial rewards for the winners.

2. Specifics of the Reviewing Process

The new journal will exhibit certain specifics in its editorial process. First of all, for clarity and transparency, the two criteria for rejecting a submitted paper have been stated in the Editorial Process file: (a) lack of originality, meaning that an identical circuit/method, etc., was published previously; (b) mistakes in the development of the ideas, equations, etc., whose correction will change the conclusions of the paper completely, requiring the writing of a new paper.

The lack of industrial applicability at the time of publication is not a criterion of rejection. Visionary, daring papers are welcome. Nobody can anticipate how future technologies will render some ideas feasible or which future applications will use a theory published now. With all modesty, paraphrasing the words of a great mathematician of the 20th century: “let’s have many great theorems, applications will come and come”, I would only replace the word “theorems” with “circuits/methods”. Nor is the closeness of a solution to a previously published one a criterion for rejection, if it presents other advantages/disadvantages. Even if, at this moment, the available solutions may be superior, nobody can foresee how future developments in electronic components or the requirements of future applications could lead to the superiority of the new solution. Again, let’s have as many correct variants as possible; new applications will come for each one.

PERA Transactions welcomes papers authored by young researchers (graduate students, post-docs, young professors) at the beginning of their scientific career. They will be the scholars of tomorrow. Even if their submitted manuscripts are not well written, as long as they communicate original ideas, our academic editors will help them to improve their texts. The Editors will guide them on how to outline their material when needed, to render confusing parts clearer, or to highlight their results.

Rejected papers by other journals can be submitted with the condition that the following materials are attached: (a) the reviews and the editorial conclusion of the previous journal; (b) a letter pointing to the changes that have been made in the manuscript following the recommendations of the previous journal with which the author agreed; and a rebuttal of the reviewers’ points with whom the author did not agree. Then, the submitted manuscript will be reviewed and judged according to the previously mentioned criteria of our journal.

In some cases, both the accepted paper and the reviews or parts of them will be published if this action can lead to interesting and stimulating discussions with readers. The journal’s role as a forum for the power electronics community will be enhanced. The community authors–reviewers–editors–readers will become stronger.

An open mechanism for complaints regarding the editorial decision has been established. The authors are encouraged to write to the Editor-in-Chief if they disagree with the outcome of the reviewing process. The EiC will pay close attention to the arguments and, if he sees valid points, will reassign the paper to the Editor-in-Charge or the Co-Editor-in-Chief for a revised review with other reviewers.

3. Content of the Inaugural Number

Sixteen papers have been accepted for publication in the inaugural number after a thorough review process. Due to publisher’s and citation databases’ constraints, the inaugural number will be divided into four issues. The papers will be published in the order of the publication date. The selected papers cover a wide range of topics in power electronics. The high quality and diversity of the contributions to this inaugural issue augur well for the future success of the new journal.

Volume 1, 1st Issue opens with the contribution of the research group of Prof. Carlo Cecati, *IEEE Life Fellow*, *past Editor-in-Chief of IEEE Transactions on Industrial Electronics*, and *past VP of IEEE Industrial Electronics Society*, and Prof. C. Buccella, *IEEE Fellow*: C. Buccella, G. Cimatori, Carlo Cecati, “**Fundamental Frequency**

Selective Harmonic Elimination Modulation Strategies for Multilevel Inverters". This paper provides an overview of the analytical methods employed for fundamental switching frequency modulation in multilevel inverters for high-power medium-voltage applications. It is followed by the paper of the group of Prof. Michael C. K. Tse, *IEEE Fellow, Member of the Hong Kong Academy of Engineering, and past Editor-in-Chief of IEEE Transactions on Circuits and Systems II and of IEEE Circuits and Systems Magazine*: X. F. Chen, Y. Zeng, C. K. Tse, C. K. Jiang, Q. Chen, C. M. Lai, **"An Overview of Wireless Motor Drive: From Cascaded Structure to Integrated Structure"**. This review focuses on the circuit topologies and operating principles of inductive power transfer-based wireless motor drive systems, which have been widely adopted due to their high efficiency and power capacity. The application of matrix converters in wireless motor drive systems is reviewed, with a detailed discussion of their modulation strategies. The paper of the research group of Prof. Henry S. H. Chung, *IEEE Fellow and Past Editor-in-Chief of IEEE Transactions on Power Electronics—Letters*: Z. Wei, H. S. H. Chung, **"Battery Equalization Systems: A Systematic Review of Topologies, Architectures, and Application Scenarios"** presents a systematic review of battery equalization systems, structured along five interconnected dimensions: application-specific requirements, hardware topologies, energy routing architectures, standardized performance metrics, and the impact of electrochemical characteristics on equalization. By mapping the technological transition from isolated circuit-level optimization to macroscopic energy routing, this review establishes a definitive roadmap for engineering highly scalable and autonomous battery management systems. The first issue concludes with the paper of the group of Prof. Hiroo Sekiya, *IEICE Fellow*: T. Kobayashi, A. Komanaka, T. Shuto, Y. Naka, H. Ota, Y. Ito, and H. Sekiya, **"Analysis and Design of Capacitive Power Transfer System with Robustness to Load Variations and Capacitor Plate Misalignment"**, which proposes a capacitive power transfer system to transmit power at high frequencies.

The second issue of the inaugural number opens with the paper of the research group of Prof. Leopoldo Franquelo, *IEEE Life Fellow, past Editor-in-Chief of IEEE Transactions on Industrial Electronics, and Past President of the IEEE Industrial Electronics Society* and Prof. Dianguo Xu, *IEEE Fellow and present Co-Editor-in-Chief of IEEE Transactions on Power Electronics*: W. Luo, Z. Jin, Z. Zhu, B. Li, L. C. Franquelo, and D. Xu, **"Super-Twisting Sliding Mode Control for Single-Stage Isolated Bidirectional V2G Chargers"**. It proposes an improved super-twisting sliding mode control (STA) strategy integrated with a low-pass filter. The proposed strategy effectively suppresses inherent chattering while retaining the strong robustness of the traditional sliding mode control. The paper of the research group of Prof. Edmond K. T. Chau, *IEEE Fellow*: H. Wang, W. Liu, A. M. H. Chau, and K. T. Chau, **"Wireless Motors—The Future of Untethered Drives"** presents a comprehensive state-of-the-art review of existing wireless motor and drive systems, with a specific emphasis on integrated designs that merge wireless power transfer with load motors to eliminate secondary-side controllers. The potential applications of the wireless motors in environments that demand high flexibility, improved protection against electric shock, and suitability for fully sealed or isolated conditions are explored. The following paper comes from the research group of the *IEEE Fellow* Prof. Siew Chong Tan: A. T. L. Lee and S. C. Tan, **"Single-Inductor-Multiple-Output (SIMO) Inverters: Design and Applications"**. It is a tutorial about the system architecture, circuit topologies, and operating principles of baseline SIMO inverters, as well as advanced SIMO-derived architectures, such as SIMO AC–AC converters and bidirectional SIMO converters. Key design considerations are emphasized. The paper of the research group of Prof. Vivek Agarwal, *IEEE Fellow and present Co-Editor-in-Chief of IEEE Transactions on Power Electronics—Letters*: V. Agarwal, U. S. Bulkunde, and G. Praveen, **"Recent Advancements in Wireless Charging of Electric Vehicles"** concludes the issue. It is a comprehensive paper reviewing recent advancements in wireless power transfer system design, including power converter topologies, compensation networks, and coil geometries, as well as emerging topics such as bidirectional wireless power transfer and dynamic wireless charging. It also includes a systematic design methodology for a series-series compensated wireless power transfer system. Finally, the paper identifies potential directions for developing high-performance, reliable, and cost-effective charging systems.

The third and fourth issues of the inaugural number continue with papers extending the breadth of topics embraced by the journal. It opens with the paper: A. Pallen, Jiefeng Hu, and Syed Islam, *IEEE Life Fellow*, **"A Load-Adaptive Virtual Resistance Strategy for Decentralized Control of Low-Voltage Islanded Microgrids"**, where an adaptive virtual resistance is analytically determined using the allowable voltage deviation, inverter rating, feeder resistance, and locally measured dq-axis voltage and current components. As the load demand increases, the calculated virtual resistance decreases automatically, thus limiting the voltage drop introduced by the virtual resistance while preserving proportional power sharing among parallel inverters. It is followed by the paper: E. Hamo, M. Evzelman, and Mor Peretz, **"Extending Conversion Ratio of a Series-Capacitor Buck Topology by Adding N Capacitor Cells"** which introduces an extension methodology for a modular multi-phase series-capacitor buck converter that enables scaling to an arbitrary number of capacitor cells,

with minimum operation states and minimum topological subcircuits. The paper: Y. Shicheng, Liangzhong He, and Y. Jian, “**Multi-Condition PSO-FOPID Current-Sharing Control for Parallel LLC Resonant Converters under Parameter Deviations**” proposes a multi-condition particle swarm optimization fractional-order proportional-integral (PSO-FOPID) current-sharing control method. A common-mode/differential-mode frequency dual-loop structure is adopted; common output-voltage regulation and interphase current-sharing regulation are mapped to the common-mode and differential-mode frequencies. The paper: T. P. Metzger, G. A. T. Bauer, B. Benedetti, L. H. D. Sismeiro, M. N. Mezaroba, N. C. Dal Pont, A. L. S. Pacheco, J. M. de Andrade, and Telles Brunelli Lazzarin, “**High-Conversion-Ratio Bidirectional DC–DC Converter Derived from Gain Cells: Analysis and Experimental Validation**” proposes a non-isolated high-conversion-ratio bidirectional converter that combines an active switched-inductor cell with an active switched-voltage-multiplier cell.

The inaugural number continues with the paper: A. T. Jamshidi, P. Panahpourian, Ebrahim Babaei, M. Sabahi, and Seyed Hossein Hosseini, “**A New Quadratic High Step-Up DC–DC Converter with Single Two-Winding Coupled-Inductor for Photovoltaic Systems Application**”. It presents an interesting design of a conventional boost topology integrated with a two-winding coupled inductor for obtaining a large dc gain with reduced switch stresses. The paper: J. Qiu, L. Cheng, and Junrui Liang, *ASME Fellow*, “**Optimal Switched-capacitor Network for Synchronized Multiple Bias-flip Piezoelectric Energy Harvesting Circuit**” addresses a less-discussed subject: an optimal reconfigurable switched-capacitor network for synchronized multiple bias-flip interfaces. The power harvesting capability for piezoelectric energy harvesting is enhanced. The paper: J. Putthong, Dylan Lu, and Chi-Kwan Lee, “**Efficient Experimental Design Framework for Reliable Parameter Identification of Electro-Thermal Models**” extends further the scope of the journal. It proposes a framework with an information-sufficiency criterion linking prescribed parameter variations to measurable temperature responses. Singular value decomposition of the parameter-sensitivity matrix identifies weak parameter directions, whose corresponding temperature responses are compared with a practical detectability threshold. The framework is demonstrated using a nonlinear electro-thermal model with thermal coupling and validated on four independently power-controlled MOSFETs representing multiple devices. And, the inaugural number of PERA Transactions concludes with a “master class” paper about reliability: Huai Wang, “**Condition Monitoring and Operation Optimization of Power Electronic Components and Systems**”. The paper examines the research gaps, methodological frameworks, and future directions for degradation estimation, fault pre-warning, and performance optimization during the operation of power electronic components and systems. It identifies the scientific and implementation challenges and discusses methodological frameworks connecting sensing, condition assessment, prognostics, and operation optimization across component and system levels, drawing on physics-of-failure, data-driven, and hybrid approaches. It outlines research directions toward more reliable, highly available, and cost-effective power electronic systems through condition-aware and risk-informed operation.

4. Acknowledgments

I should like to express my appreciation to all colleagues of our Editorial Board who agreed to dedicate a part of their time to the success of *PERA Trans*. Their perseverant work was important in getting this inaugural number on time. Special thanks go to Prof. Ivo Barbi, IEEE Life Fellow, who shared all the challenging moments and passionately helped to find solutions to rather difficult situations. The reviewers of the submitted manuscripts did a remarkable job, which is to be acknowledged. And last but not least, the Scilight Press publisher’s dedication was essential to reaching this moment of publishing the inaugural number of *PERA Transactions*.

5. A Message to Our Readers

Dear Readers: The authors and the editors did their best to offer you a new high-quality journal in power electronics. It is now your turn. You are invited to express your questions and comments, or even contrary ideas in Letters to the Editor. They will be addressed in the replies from the authors or editors published in the journal.

And, following the example of our colleagues who replied to the first Call for Papers of the journal, be inspired to submit your high-level research outcomes or your industrial applications as manuscripts to our *PERA Transactions*. Our endeavor to be the first-chosen publication for power electronics scholars and the practising community will always be present.

6. Biographies of the Authors

Adrian Ioinovici, holds permanent, temporary, or honorary professorships from different universities in the world. He received the IEEE Fellow grade in 2004 for “pioneering work in switched-capacitor converters”. He served in different periods of the last 40 years as an Associate Editor for different journals, including IEEE

Transactions on Circuits and Systems, Journal of Circuits, Systems, and Computers, IEEE Transactions on Industrial Electronics, IEEE Transactions on Power Electronics, or as a Guest-Editor of special issues of many journals. He authored the books *Computer-Aided Analysis of Active Circuits* (New York: Marcel Dekker, 1990) and *Power Electronics and Energy Conversion Systems, Volume 1: Fundamentals and Hard-switching Converters* (Wiley, 2013). His main research interests are switching-capacitor (SC) converters and inverters, large dc gain converters, hybrid-SC power electronics, soft-switching converters. He published over 200 papers in IEEE Transactions and conferences. Prof. Adrian Ioinovici is the founder and Editor-in-Chief of the journal *Power Electronics Research and Applications (PERA) Transactions*.

Conflicts of Interest

The author declares no conflict of interest.

Use of AI and AI-Assisted Technologies

No AI tools were utilized for this paper.