

Special Section on:

Advanced Modeling, Control, Applications and Safety of Energy Storage Systems

Theme: Aiming to the sustainable economic development and coping with the climate change and energy crisis, the energy storage systems (ESSs) have been worldwide developed and adopted with the applications of renewable energy, electric vehicles (EV), green buildings, etc. ESSs involves various technologies, which yield different devices, including lithium-ion batteries, vanadium redox batteries, supercapacitors, flywheels, fuel cells, compressed-air storage, pumped-hydro storage, and so on. These ESSs possess extensively varying features pertaining to energy density, power density, lifespan, storage pattern and aging. Furthermore, the utilizations of ESSs accomplish different functions including renewable energy integration, power load fluctuation suppression, power quality improvement, electricity market participation, backup/emergency power, propulsion power sources, transportation power support, etc. Consequently, because diverse ESSs in various applications involves huge capital investment, production security and human safety, the safe operation of ESSs is crucial.

The remarkable differences in features and functions of ESSs require the advanced modeling methods to clearly describe the behaviors. The control methods play all important role in taking the full advantages of single or hybrid ESS and effectively achieve the expected functions. On the other hand, emerging application scenarios, such as robotics, EV charging station, data center, and seasonal energy storage, appears gradually with the technology progress and cost decrement, which desires the exploration of operation and commercial modes. Last but not the least, the safety management and technique for ESSs is imperative to avoid system instability, energy supply unreliability, fire incidents, human and asset loss, environmental pollution, etc. In summary, it is of great significance to explore advanced modeling, control, safety, and application for ESSs. We encourage all researchers working in this area to submit papers to this Special Section. Topics of interest include, but are not limited to:

- ✓ **Advanced modeling methods for ESSs, including grey box modeling, energy-mass balance model, neural network modeling, data-driven modeling, etc**
- ✓ **Cyber physical and digital twins and hardware in the loop methodology for ESSs**
- ✓ **Estimation and smart management for the state and health of ESSs**
- ✓ **Advanced control strategies for ESSs, including model/model-free predictive control, event-triggered control, iterative learning control, artificial intelligence-based control, etc.**
- ✓ **Applications of ESSs, including grid-forming mode ESSs, ESSs aided charging stations, ESSs embedded green buildings, ESSs integrated power sources, hybrid utilization of ESSs, etc**
- ✓ **Safety management for prevention and control of ESSs' the hazards and accidents, including thermal runaway, fire catching in particular for lithium-ion batteries, vanadium electrolytes leakage and corrosiveness, mechanical breakdown, hydrogen leakage, high pressure risk, etc.**

Manuscript Preparation and Submission

Check carefully the style of the journal described in the guidelines “Information for Authors” in the IEEE- IES website: <http://www.ieee-ies.org/pubs/jestie>. Please submit your manuscript in electronic form through: <https://mc.manuscriptcentral.com/jestie-ieee/>.

On the submitting page, in pop-up menu of manuscript type, select: “**SS on Advanced Modeling, Control, Applications and Safety of Energy Storage Systems**”, then upload all your manuscript files following the instructions.

Corresponding Guest Editor

Assoc. Prof. Abhisek UKIL
The University of Auckland,
New Zealand
Email: a.ukil@auckland.ac.nz

Guest Editor

Assoc. Prof. Benfei WANG
Sun Yat-sen University, China
Email: wangbf8@mail.sysu.edu.cn

Guest Editor

Dr. Yang LI
Chalmers University of
Technology, Sweden
Email: yang.li@chalmers.se

Guest Editor

Dr. Liang XIAN
Huawei Singapore,
Singapore
Email: xian.liang@huawei.com

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