

Article A critical review of data-driven transient stability assessment of power systems: principles, prospects and challenges Shitu Zhang 1, Zhixun Zhu 2, Yang Li 1,* 1 School of Electrical Engineering, Northeast Electric Power University, Jilin 132012, China; 2 GHN Energy Jilin Jiangnan Thermal Power CO., LTD, Jilin 132013, China. * Correspondence: ...

1. Introduction. Short-term voltage stability assessment (STVSA) is the linchpin for ensuring the secure and stable operation of a power system [] urban load centers, the proportion of dynamic loads with fast recovery characteristics such as air conditioners, refrigerators, and industrial motors is increasing, and short-term voltage stability (STVS) ...

Since traditional time-domain simulations and direct method cannot meet the actual operation requirements of power systems, data-driven TSA has attracted growing attention from both academia and ...

[Show full abstract] objective of this study is to review and to discuss the geothermal-driven ORC systems for power generation in a detailed way. Moreover, the special novelty is the emphasis ...

Our review paper explores the prospects and challenges of using machine learning and data-driven methods in power systems and provides an overview of the ways in which the predictive analysis for ...

The wind-thermal bundled power system achieves energy complementarity and optimized scheduling, which is an important way to build a new type of energy system. For the safe and stable operation of the wind-thermal bundled power system, accurate data-driven analysis is necessary to maintain real-time balance between electricity supply and ...

High renewable penetration brings diversified operation states and complex dynamic behaviors to power systems and challenges the dynamic security assessment calculation. Data-driven methods have become increasingly important to address this challenge. However, the performance of data-driven DSA is heavily driven by the quality of the database generated for ...

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The precision and dependability of data-driven approaches employed for the management and assessment of power systems are highly dependent on the choice of the data representation (i.e., properties derived from the source data) [] nsequently, the majority of issues regarding the use of traditional data-driven algorithms for

power systems are centered ...

With the rapid growth of power systems measurements in terms of size and complexity, discovering statistical patterns for a large variety of real-world applications such as renewable energy prediction, demand response, energy disaggregation, and state estimation is considered a crucial challenge. In recent years, deep learning has emerged as a novel class of ...

Meteorological changes urge engineering communities to look for sustainable and clean energy technologies to keep the environment safe by reducing CO₂ emissions. The structure of these technologies relies on the deep integration of advanced data-driven techniques which can ensure efficient energy generation, transmission, and distribution. After conducting ...

To ensure the reliability as well as security of the network's smart-driven power system, more advanced monitoring and measurement technology, which is dominated by SCADA systems, is required ...

The usage of AI is emphasized due to its computational speed for online performance and its flexibility for providing corrective actions for insecure operating conditions to achieve a seamless transition in power systems. In this review, various available data-driven methods in power system security are comprehensively reviewed into two primary ...

In recent years, electric vehicles (EVs) have become increasingly popular, bringing about fundamental shifts in transportation to reduce greenhouse effects and accelerate progress toward decarbonization. The role of EVs has also experienced a paradigm shift for future energy networks as an active player in the form of vehicle-to-grid, grid-to-vehicle, and vehicle-to ...

Transient stability assessment (TSA) has always been a fundamental means for ensuring the secure and stable operation of power systems. Due to the integration of new elements such as power electronics, electric vehicles and ...

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AI-powered design optimization tools have been shown to yield substantial enhancements in accuracy, as evidenced by studies indicating a reduction in design errors and iterations by up to 30%.⁵³ Moreover, the streamlined installation processes facilitated by AI can lead to time savings ranging from 20% to 40% compared to traditional methods ...

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Driven power systems review

Keywords: transient stability assessment; power systems; data-driven approach; feature extraction and selection; model construction; review 1. Introduction Transient stability assessment (TSA) is a fundamental means for ensuring the secure and stable operation of power systems. Transient stability of power systems refers to the

Review of Small-Signal Converter-Driven Stability Issues in Power Systems ... based on power electronics technologies are increasingly emerging and introduce two new types of stability issues into ...

The physical power system belongs to a continuous system that has continuous-time behaviors of voltage, current, frequency and power. The cyber system is a typical discrete-state event-driven system that consists of communication network, analysis, and control process aiming to supervise the physical system.

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Given China's ambition to realize carbon peak by 2030 and carbon neutralization by 2060, hydrogen is gradually becoming the pivotal energy source for the needs of energy structure optimization and energy system transformation. Thus, hydrogen combined with renewable energy has received more and more attention. Nowadays, power-to-hydrogen, power-to-methanol, ...

The digital transformation of power systems into cyber-physical systems (CPSs) is the inevitable trend of modern power systems with the integration of large-scale renewable energy. The in-depth interdependence of cyber and physical spaces leads to more complicated external environments for such cyber-physical power systems (CPPSs) and brings ...

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