

Reliability is a critical goal for power systems. Due to the connectivity of power grids, an initial failure may trigger a cascade of failures and eventually lead to a large-scale blackout, causing significant economic and social impacts. Cascading failure analysis thus draws wide attention from power system practitioners and researchers.

For the cascading failure model in, we have combined the DC power flow model and relay-based overloading branch tripping model, which is a commonly adopted approach in the state-of-the-art of power systems" cascading failures analysis . The numerical simulation results on the critical branches and disruptive disturbances are validated by ...

The massive power flow transferring triggers the node overload cascade, which further activates the protection system hidden failures. In this study, we propose a cascading failure model based on complex network theory by combining the node overload failures and hidden failures of transmission lines in blackouts together.

The improved understanding of the failure process permits us to develop effective mitigating strategies consisting of adaptive power balance restoration and selective edge protection for cascading failure propagation. In addition, we propose a set of indexes to measure the local and nonlocal propagation risks of cascading failures.

Cascading failures in power systems are extremely rare occurrences caused by a combination of multiple, low probability events. The looming threat of cyberattacks on power grids, however, may result in unprecedented large-scale cascading failures, leading to a blackout. Therefore, new analysis methods are needed to study such cyber induced phenomena. In this article, we ...

One feature of cascading behaviors seen in systems as varied as electric blackouts, forest fires, financial markets, and firing of brain neurons (1, 6, 7) is that the sizes of the observed cascades follow a power-law distribution. The seminal "Bak-Tang-Wiesenfeld sandpile" model of self-organized criticality provides a theoretical underpinning for this property.

83 Figure 4-3: Power System Internal Dependence Cascading Failure in the 2003 Northeast Blackout 84 85 86
Figure 4-4: External Dependence Cascading Failure in the 2003 Northeast Blackout 87 4.2.2. Time
Dependency 88 Recovery Phases 89 After a disaster, the time to restore critical services depends on how
rapidly an infrastructure system and ...

Cascading failure is the usual mechanism by which failures propagate to cause large blackouts of electric power transmission systems. For example, a long, intricate cascades of events caused the August 1996 blackout in Northwestern America that disconnected 7.5 million customers and 30 GW of electric power. 1-3

The August 2003 blackout in Northeastern ...

2.2 Cascading Hidden Failure Model. Cascading failures are system failures where the failure of a system component triggers the successive components and possibly spread among the entire system. Hidden failures are among the top reasons for cascading failures in the power system [7, 10].

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The increasing penetration of wind power may have a profound effect on the cascading dynamics of power delivery systems. In this study, we consider the impacts of packet traffic congestion, power overloading and network interaction on the failure evolution, and investigate the impacts of wind uncertainty and penetration level on the vulnerability of the ...

Since cascading failure is treated as an infrequent but extreme event, which has less occurrence probability but can bring great damage to the whole power system, we define $(\delta_{\{Y_k \geq Y_{\text{ext}}\}})$ as an indicator that selects the cascading failure chain in which the load loss exceeds (Y_{ext}) , the setting loss threshold.

The early detection of cascading failure plays an important role in the safe and stable operation of the power system with high penetration of renewable energy. This paper proposes a fault propagation dynamic model based on the epidemic model, and further puts forward a method to detect the development of cascading failures. Through the simulation of ...

In contemporary power systems, the potential for cascading failures and subsequent blackouts looms large, particularly under significant system stress. This stress often stems from uncertainties in renewable power generation and fluctuations in load demand, both of which pose formidable challenges to grid stability. This paper presents a comprehensive ...

creasingly attractive for addressing cascading failure problems. This survey provides a comprehensive overview of ML-based techniques for analyzing cascading failures in power systems. The survey categorizes these techniques based on the evolutionary phases of the cascade process in power systems, as well as studies

This paper studies cascading failure propagation in power systems and presents methods for the quantification of important properties of failure propagation. First, the topological properties of cascading failure propagation are examined. This includes an analysis of the electrical distance between consecutive failures, shedding light on the spatial spread of failures. Additionally, the ...

previous computational work did not consider power grids and cascading failures. Recent work on cascades focused on probabilistic failure propagation models (e.g., [17,18,45], and references therein). However, real

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cascades [1,2,42] and simulation studies [11,12] indicate that the cascade propagation is different than that predicted by such models.

The AC power flow based cascading failure analyses model is an integral part of the Cascades platform, which is a tool for power system security assessment and transmission system expansion planning [30]. The cascading failure analyses model: simulates critical scenarios that may trigger cascading events; identifies island operations and ...

Due to cascading failure, the power system is separated into independent islands and finally leads to collapse and blackout in each island . Therefore, if the potential of cascading failure and the resulting blackout due to the outage of the line can be evaluated and predicted, respectively, a set of preventive actions can be taken to reduce ...

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