Spatial prediction of thermal power storage field

On the other hand, a power function best described burst time (the irradiation time at which the specimen burst into fragments) vs. power level (for a given specimen size) and burst time vs ...

Spatiotemporal datasets, which consist of spatially-referenced time series, are ubiquitous in diverse applications, such as air pollution monitoring, disease tracking, and cloud-demand forecasting.

In the phase-field model, a continuous phase-field variable $i(r,t)$ is used to describe the temporal and spatial evolution of the breakdown phase: $i(r,t) = 1$ and $i(r,t) = 0$ denote the broken and ...

An accurate prediction of thermal field distribution, that is, acquiring any location of interest in a thermal field at the present and future time, is essential to provide useful information for ...

This spatial thermal and failure combined algorithm is applicable in any indoor/underground substations. It could help a lot in underground/indoor substation condition monitoring, such as power equipment ageing evaluation, operation status estimation, and cooling strategy design. 2 Spatial failure model coupled with thermal simulations

Request PDF | On Nov 15, 2017, Yaran Wang and others published Thermal transient prediction of district heating pipeline: Optimal selection of the time and spatial steps for fast and accurate ...

The temperature field prediction of lithium-ion batteries (LIBs) plays a crucial role in the safety of electric vehicles and their lifetime. ... in which the trained low-order temporal coefficients are reconstructed with spatial BFs to describe the thermal dynamic of LIBs. ... A review of power battery thermal energy management. Renew. Sustain.

With the rapid development of data acquisition and storage technology, spatio-temporal (ST) data in various fields are growing explosively, so many ST prediction methods have emerged. The review presented in this paper mainly studies the prediction of ST series. We propose a new taxonomy organized along three dimensions: ST series prediction methods ...

In this section, we contextualize our methodological framework in relation to existing work in the field. Classical methods for spatio-temporal modelling include state-space models 12 and Gaussian ...

This study proposes a data-driven temperature field prediction method for the pouch cell thermal process, a typical distributed parameter system (DPS). First, empirical ...

Therefore, the results underline that a differential and time-accurate model, like the TES-PD, even if one-dimensional, allows a fast and effective prediction of the performance ...

The breakthrough in prediction is attributed to the awareness of global structure and local spatial atom interactions endowed by the developed Matformer, which provides the intuitive visualization ...

Pumped storage power stations in the power system have a significant energy saving and carbon reduction effect and are mainly reflected in wind, light, and other new energy grid consumption as well as in enhancing the proportion of clean energy in the power system [11, 12].The use of pumped storage and photovoltaic power, wind power, and other intermittent ...

In the phase-field model, a continuous phase-field variable i (r, t) is used to describe the temporal and spatial evolution of the breakdown phase: i $(r, t) = 1$ and i $(r, t) = 0$ ...

The spatial resolving of temperature gradient is a key but challenging issue for the loading performance, aging evaluation, and safety guarantee of large format lithium battery, while the internal temperature cannot be measured directly in field. Notable temperature difference of large format battery emerges in heavy load applications. This paper tries to solve ...

Spatial autocorrelation was used to analyze the spatial distribution of carbon storage. The results revealed a rapid urban expansion encroaching on cultivated land and forest from 2010 to 2020, resulting in a total urban area of 1957.50 km2 by 2020. Carbon storage experienced a total loss of 6.86 × 106 t, primarily between 2010 and 2015.

The power of LIBs is generated by the electrochemical reactions inside the battery. The electrochemical reactions at the electrode/electrolyte interface are closely related to the battery temperature. ... efforts will be devoted to extending the proposed approach to model the battery thermal process with higher spatial dimensions ...

Thus, this paper proposes a spatiotemporal modeling scheme for the thermal process of lithium batteries based on spectral method and broad learning system (BLS). According to the ...

Predicting the temperature field during the direct energy deposition (DED) process is vital for the microstructure control and property tuning of fabricated metals. The widely used data-driven machine learning method for accurate temperature prediction, however, is impractical and computation-intensive due to its sole reliance on large datasets; also being a ...

This paper provides an overview of the application of machine learning (ML) techniques for predicting the spatiotemporal evolution of thermal fields during additive manufacturing (AM) processes. AM, also known as three-dimensional printing, has gained significant attention in various industries due to its potential for rapid

Spatial prediction of thermal power storage field

prototyping and ...

The three-dimensional temperature field prediction model proposed in this study can be used for feedforward control. ... temperature and heat dissipation power of other internal heat sources to obtain the air supply regulation amount of every zone, thus fine-tuning to improve thermal comfort and energy efficiency. 4.3. Limitation. Since the ...

Hot dry rock (HDR) resources are gaining increasing attention as a significant renewable resource due to their low carbon footprint and stable nature. When assessing the potential of a conventional geothermal resource, a temperature field distribution is a crucial factor. However, the available geostatistical and numerical simulations methods are often influenced ...

However, establishing an accurate thermal network model is critical due to the complex spatial-temporal coupling and transformation relationship of the transient temperature field. This paper proposes a spatial-temporal merge relational graph convolutional neural network model, based on least squares method, for transient temperature field ...

Adaptive power allocation using artificial potential field with compensator for hybrid energy storage systems in electric vehicles. ... Spatial-temporal data-driven full driving cycle prediction for optimal energy management of battery/supercapacitor electric vehicles. ... Journal of Energy Storage 73, 109199, 2023. 7:

The state of national energy development affects a country"s politics and economy [], and energy security is related to a country"s social development and is an important part of national security [2,3].As the world"s largest developing country, China is rich in coal resources but poor in oil and gas [].Due to its high energy consumption, China has become a ...

The training data was generated from high-resolution Google Earth image of 10 m in the absence of field data. ... The basin is a hub of industries such as thermal power plants and steel plants and supports mining activities, ... Based on the comparison of the relative importance of the spatial factors for LULC predictions, the population ...

Five main spatial estimation methods were used; eight methods one counts the within-method variations () terpolated weather (W INT): Daily weather data were interpolated to the testing data sites for which the crop model was run terpolation was done via thin plate spline (TPS) models with longitude, latitude, and elevation as independent variables.

A real case study of thermal fields during grain storage is conducted to validate our proposed approach. Grain thermal field prediction results provide a deep insight of grain quality during storage, which is helpful for the manager of grain storage to make further ... ambient temperature or radiation power) and intrinsic factors (e.g., self ...

Spatial prediction of thermal power storage field

This spatial thermal and failure combined algorithm is applicable in any indoor/underground substations. It could help a lot in underground/indoor substation condition monitoring, such as power equipment ageing evaluation, ...

With this novel reduction dimension technique, the spatiotemporal temperature variables are separated into spatial basis functions and low-dimensional time variables. Then, to handle the ...

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Thermal fields exist widely in engineering systems, and an accurate thermal field distribution, that is, acquiring any location of interest in a thermal field at the present and future time, is ...

The influence of street spatial form on thermal comfort from urban morphology and human-centered perspectives has been underexplored. This study, utilizing multi-source data and focusing on urban central districts, establishes a refined index system for street spatial form and a thermal comfort prediction model based on extreme gradient boosting (XGBoost) and ...

A latent heat storage system to store available energy, to control excess heat generation and its management has gained vital importance due to its retrieve possibility. The design of geometry parameters for the energy storage system is of prime interest before experimentation. In the present study, a numerical investigation of 2D square enclosure filled with phase change ...

Purpose China has proposed two-stage goals of carbon peaking by 2030 and carbon neutralization by 2060. The carbon emission reduction effect of the power industry, especially the thermal power industry, will directly affect the progress of the goal. This paper aims to reveal the spatial-temporal characteristics and influencing factors of carbon emission ...

The temperature field prediction of lithium-ion batteries (LIBs) plays a crucial role in the safety of electric vehicles and their lifetime. However, it is essentially a nonlinear distributed parameter system (DPS), and suitable partial differential equations are difficult to obtain.

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