Spatial prediction of thermal power storage field

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 ...

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 ...

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 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 ...

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 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 ...

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 ...

Wind speed and power prediction models can be broadly classified into two approaches, as shown in Fig. 1: One is to forecast wind speeds and then convert them to power estimates using turbine-specific power curves, and the other is to build artificial intelligence or statistical models to directly forecast power.The former focuses on wind speed forecasting, ...

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 ...

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 ...

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.

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

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.

Recently, global climate change discussions have become more prominent, and forests are considered as the ecosystems most at risk by the consequences of climate change. Wildfires are among one of the main drivers leading to losses in forested areas. The increasing availability of free remotely sensed data has enabled the precise locations of wildfires to be ...

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 ...

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