Wind vibration of photovoltaic support

Does wind-induced vibration affect flexible PV supports?
Discussion The wind load is a vital load affecting PV supports, and the harm caused by wind-induced vibration due to wind loads is enormous. Aiming at the wind-induced vibration of flexible PV supports, a PV building integration technology [86, 87] was proposed to reduce the harm caused by wind vibration.

How wind induced vibration response of flexible PV support structure?
Aeroelastic model wind tunnel testsThe wind-induced vibration response of flexible PV support structure under different cases was studied by using aeroelastic model for wind tunnel test,including different tilt angles of PV modules,different initial force of cables,and different wind speeds.

Can a PV building integration technology reduce wind-induced vibration?
Aiming at the wind-induced vibration of flexible PV supports,a PV building integration technology [86,87]was proposed to reduce the harm caused by wind vibration. PV building integration (Figure 18) is a technology that integrates solar power generation products into buildings.

Does wind-induced vibration affect a cable-supported PV module?
Therefore, both aeroelastic and rigid model wind tunnel tests were conducted to investigate the wind-induced vibration (WIV) characteristics of a typical cable-supported PV module. The effects of module tilt angle, cable pre-tension, and wind speed on the vertical displacement response and the aerodynamic damping were evaluated.

Are flexible PV support structures prone to vibrations under cross winds?
For aeroelastic model tests,it can be observed that the flexible PV support structure is prone to large vibrationsunder cross winds. The mean vertical displacement of the flexible PV support structure increases with the wind speed and tilt angle of the PV modules.

What are the main wind load issues associated with PV supports?
Making full use of the previous research results, the following are the main wind load issues associated with the three types of PV supports: (1) the factors affecting the wind loads of PV supports--the main factors are shown in Figure 2; (2) the wind-induced vibration of PV supports; (3) the value and calculation of the wind load of a PV support.

(3) Conclusions: According to the particularity of the PV support structure, the impact of different factors on the PV support''s wind load should be comprehensively considered, and a more ...

Given the sensitivity of flexible PV support structures to wind loads and their pronounced wind-induced vibration responses in large-span settings, the development of effective vibration control measures is of ...

The shielding effects and tilt angle of PV modules on the wind load and wind-induced vibration of the flexible PV support were studied. The experimental results show that in the rigid model wind tunnel test, the wind pressure on the surface of PV modules exhibits a gradient distribution along the direction of wind flow, with symmetric distribution along the mid ...

4 · DOI: 10.1016/j.solener.2024.113096 Corpus ID: 274102260; Wind-induced vibration response and suppression of the cable-truss flexible support photovoltaic module array @article{Wu2024WindinducedVR, title={Wind-induced vibration response and suppression of the cable-truss flexible support photovoltaic module array}, author={Yunqiang Wu and Yue Wu and ...

Meanwhile, the displacement wind-induced vibration coefficient and the support reaction wind-induced vibration coefficient should be considered separately for different tilt angles. ... : Solar Energy welcomes manuscripts presenting information not previously published in journals on any aspect of solar energy research ...

DOI: 10.1016/j.engstruct.2023.117125 Corpus ID: 265078200; Experimental investigation on wind-induced vibration of photovoltaic modules supported by suspension cables @article{Xu2024ExperimentalIO, title={Experimental investigation on wind-induced vibration of photovoltaic modules supported by suspension cables}, author={Haiwei Xu and Kunyang Ding ...

Photovoltaic (PV) system is an essential part in renewable energy development, which exhibits huge market demand. In comparison with traditional rigid-supported photovoltaic (PV) system, the ...

The wind-induced vibration of the cable support photovoltaic module system is vertical bending vibration at low wind speed, but multi-mode coupled vibration mode at high wind speed. ... Instability mechanism and failure criteria of large-span flexible pv support arrays under severe wind. Sol. Energy, 264 (2023), Article 112000, 10.1016/j ...

There are, however, few studies concerned with the aeroelastic vibration of PV structures under the tension cable support system. Tamura et al. [14] studied the aerodynamic instability of a cable-supported solar system using wind tunnel experiments and found that vertical vibration is closely dependent on sag, wind speed, and azimuth, and cable sudden collapse ...

Wind-induced, long-term vibration problems have come to prominence, leading to structural fatigue and cracking of PV modules. Therefore, aerodynamic vibration ...

Kim et al. (2018, 2020) conducted wind tunnel tests to investigate the wind-induced vibration of the flexible PV support system with different module shapes and oncoming flows. The experimental results show that the mean and fluctuating displacement of the solar wing system are closely related to the module shape and the wind environment.

This article investigates a flexible photovoltaic bracket"s response to wind vibration. A finite element model is established using SAP2000 software for time course analysis.

Research related to wind-induced vibration in flexible PV support systems is still relatively limited. He et al. [2] conducted wind tunnel tests to simulate wind-induced vibration in a specific type of cable-supported PV module, and they found that pronounced vibrations became evident once the wind speed surpassed a critical threshold.

The wind resistance design is mainly based on empirical knowledge and lacks the support of a wind resistance design theory. Download: Download high-res image (757KB) Download: ... The lack of research on the occurrence mechanism and control methods of torsional vibration in tracking photovoltaic support system, and particularly on its torsional ...

This article investigates a flexible photovoltaic bracket"s response to wind vibration. A finite element model is established using SAP2000 software for time course analysis. Representative units and nodes were selected to analyze internal force response, displacement response, and acceleration response. The prestress and span change rule of the flexible ...

The ultimate bearing capacity of the large span flexible PV support array under severe wind can be characterized by the critical damage wind speed. The variation curves of displacement with wind speed of large-span flexible PV support array under different wind direction angles is shown in Fig. 15. Due to the fact that the displacements of the ...

The responses mentioned in this manuscript are all wind-induced vibration of PV support structures. We have carried out the unification in this paper, named wind-induced vibration. There are more examples of such issues in the article submitted for review. In the reviewer"s opinion, scientific work should avoid generalizations typical of ...

DOI: 10.1016/j.jweia.2020.104275 Corpus ID: 224864717; Wind-induced vibration and its suppression of photovoltaic modules supported by suspension cables @article{He2020WindinducedVA, title={Wind-induced vibration and its suppression of photovoltaic modules supported by suspension cables}, author={Xuhui He and Haojiang Ding ...

to evaluate and calculate the wind load to lessen the damage that a PV support"s wind-induced vibration causes, improve the force safety of PV supports, and thereby enhance the power...

Photovoltaic (PV) modules are mainly mounted on the ground and on roofs. Recently, cable-supported PV modules have been proposed to replace traditional beams using suspension cables to bear the loads of the PV modules. These modules have a long span, are lightweight, can bear strong loads, can be adapted to complex terrains, and provide an excellent supplement to ...

Wind vibration of photovoltaic support

The wind load is a critical factor for both fixed and flexible PV systems. The wind-induced response is also one of the key concerns. Existing research mainly concentrates on the wind-induced behavior of PV panels through wind tunnel tests and Computational Fluid Dynamics (CFD) simulations to determine wind pressure coefficients, which are used to ...

The wind-induced response and vibration modes of the flexible photovoltaic (PV) modules support structures with different parameters were investigated by using wind tunnel based on elastic test model. The results show that 180° is the most unfavourable wind direction for the flexible PV support structure. For double-cable flexible PV supports,

Tan et al. established a model of a row of three-span single-layer prestressed cables photovoltaic support, investigated the wind vibration response of the cable support by performing time-history analysis on the support subjected to fluctuating wind loads, and compared them with the displacements under static loads. The results indicated that the single ...

Semantic Scholar extracted view of "Experimental study on critical wind velocity of a 33-meter-span flexible photovoltaic support structure and its mitigation" by Jiaqi Liu et al. ... This article investigates a flexible photovoltaic bracket"s response to wind vibration. A finite element model is established using SAP2000 software for time ...

Wind load produces vibrations of PV panels, which is one of the main factors for their failure. In this study, the wind-induced vibration response of the PV panel supports was analyzed.