Analysis of Photovoltaic Panel Wind Pressure Test Diagram

Why do we need a wind load analysis for floating PV systems?
This information will be useful for the system designer of the floating PV system who wants to know the detailed wind loads on solar panel arrays. Furthermore, this economic analysis could be used for the systems which are installed with regular intervals structures in harsh wind loads.

What is the wind loading over a solar PV panel system?
Jubayer and Hangan (2014) carried out 3D Reynolds-Averaged Navier-Stokes (RANS) simulations to study the wind loading over a ground mounted solar photovoltaic (PV) panel system with a 25 ° tilt angle. They found that in terms of forces and overturning moments, 45 °, 135 ° and 180 ° represents the critical wind directions.

How does wind load affect a floating PV system?
Effect of wind loads on the solar panel array of a floating PV system: (a) forward direction, and (b) backward direction. Furthermore, many studies simply measured the local pressure distributions, however, they have limitation that they could not suggest the better options on the economic aspect.

How do we measure aerodynamic load on a solar panel?
In order to quantify the aerodynamic loading on the panel's structure,extensive experimental tests were performed using a wind tunnel. Once the critical wind directions and panel inclinations were determined,a numerical analysis of the structural components was performed.

Do PV panels have uneven wind pressure coefficients?
It is important to note that when the upper and lower rows of PV panels align with the wind direction at 0° and 180°,the wind pressure coefficients are close to 0,rendering the analysis of uneven wind pressure coefficients for these directions unnecessary.

Do geometric dimensions affect wind loads on roof-mounted PV panels?
Stenabaugh et al. (2015) studied the effects of geometric dimensions on the wind loads acting on roof-mounted PV panels via wind tunnel tests and found that both larger gaps between panels and smaller gaps between the panel and roof surface can produce lower wind loads.

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