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INCLUDING SOLAR PANELS ON PARKING AREAS IN THE SUSTAINABLE DEVELOPMENT CONCEPT. WIND EFFECTS

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Abstract

Solar energy is one of the most important renewable resources due to its unique set of advantages. In urban configurations, wide open spaces used for parking areas close to malls, stadiums and industrial areas become justified challenges in reevaluating them by placing solar panels on their wide roofs.

The paper is a first attempt that reflects the scientific interest in the particularities of wind action upon the solar panels sustained by structural framed elements and which cover the parking areas. These complex studies consist in experiments on physical scale models in wind tunnel in parallel with numerical simulations of wind flow over the solar panels, highlighting the variations of the wind pressure along the rows of solar panels for the situations that may occur, of either a completely free parking area or, fully occupied with vehicles. The aim was to evaluate from both qualitative and quantitative point of view the nature of the air flow in the solar panels field, having in view the essential differences from the situation when the solar panels are directly placed on the roofs of the buildings. The experiments considered different degrees of filling the parking areas with vehicles. The physical modelling uses an original methodology of pneumatic averaging of the pressures for the determination of the resultant wind pressure on the surfaces of the panels, which avoids blocking of the free flow stream under the rows of the solar panels and the numerical simulation of turbulent wind flow uses ANSYS 12 CFX programs.

Key words: parking areas, simulation of wind flow, solar panels, wind tunnel

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