

Numerical analysis for solar panel subjected to an external force to overcome adhesive force in desert areas

ABSTRACT

The dust accumulation is an undesirable phenomenon in a solar plant environment. The dust removing procedures were using traditional techniques which are led to more loss in power especially in desert areas. Additionally, most of the cleaning techniques are designed according to the concept of vanquishing the adhesive force of dust particles by adding a harmonic excitation force. This force may produce damage to the solar panel. Therefore, the main objective of the current study is to simulate a traditional solar panel model BSP32-10 with ANSYS software throw an additional external force (2, 4, 6, 10, and 15 Newton) throws six mode shapes and verified experimentally. Deformation values of solar panel surface increase with an increase in excitation force, and not exceed the natural frequency deformation, with average values from 0.07 to 1.5 mm, while 94% of these results are close to experimental work during verification action. Middle position of the solar panel for excitation force on the solar panel in the dust removal concept is the best position.

Keyword: Solar panel; External force; Adhesive force; Deformation; Dust