Removal of dust from the solar panel surface using mechanical vibrator

ABSTRACT

Soiling and its effect on the performance of solar modules are generally of high concern for regions with a high deposition of dust and low frequency and less intensity of rainfall. The procedure of removing dust using traditional methods is capital and labour intensive. Additionally, most of the cleaning methods consumed power from the energy produced by the solar system. Therefore, the main objective of this study is to investigate the effect of vibration magnitude on the dust removal index of solar panel. In this work, wind energy was transformed into mechanical energy i.e. vibration. The mechanical vibrator attached to a panel produced harmonic excitation force to overcome the adhesive force between the dust particles and the surface of the solar panel. The generated vibration force has a linear relationship with the air velocity. This new designed and fabricated system was able to remove 3.5 gram of dust out of 5 grams on the panel with a vibration force of 3.128 N at a tilt angle of 15°. The new system has effectively proven that wind energy if being converted into vibration force can be used for dust removal from the solarpanel surface.