World Academy of Science, Engineering and Technology
International Journal of Mathematical and Computational Sciences
Vol:14, No:12, 2020

PVMODREL© Development Based on Reliability Evaluation of a PV Module Using Accelerated Degradation Testing

Authors : Abderafi Charki, David Bigaud

Abstract : The aim of this oral speach is to present the PVMODREL© (PhotoVoltaic MODule RELiability) new software developed in the University of Angers. This new tool permits us to evaluate the lifetime and reliability of a PV module whatever its geographical location and environmental conditions. The electrical power output of a PV module decreases with time mainly as a result of the effects of corrosion, encapsulation discoloration, and solder bond failure. The failure of a PV module is defined as the point where the electrical power degradation reaches a given threshold value. Accelerated life tests (ALTs) are commonly used to assess the reliability of a PV module. However, ALTs provide limited data on the failure of a module and these tests are expensive to carry out. One possible solution is to conduct accelerated degradation tests. The Wiener process in conjunction with the accelerated failure time model makes it possible to carry out numerous simulations and thus to determine the failure time distribution based on the aforementioned threshold value. By this means, the failure time distribution and the lifetime (mean and uncertainty) can be evaluated. An example using the damp heat test is shown to demonstrate the usefulness PVMODREL.

Keywords : lifetime, reliability, PV Module, accelerated life testing, accelerated degradation testing
Conference Title : ICSRD 2020 : International Conference on Scientific Research and Development
Conference Location : Chicago, United States
Conference Dates : December 12-13, 2020