Performance Assessment of Hetero-Junction Intrinsic Thin Film (HIT) Photovoltaic Module by Machine Learning Methods

Abstract –

A hetero-junction intrinsic thin film is a solar cell made up of ultra-thin amorphous silicon and high-quality mono-crystalline silicon. It has a pyramid surface on its front which increases the absorption of sunlight. The performance of hetero-junction intrinsic thin-film photovoltaic module using real I–V (current-voltage) characteristics is affected strongly by the operating environment. Solar irradiance is very much affected by changes in the environment. Clouds also have a large impact on the solar irradiance received by a PV cell.

In this project, we will be investigating the effects of sudden fluctuating of the environmental conditions on power output and model temperature of a HIT (Heterojunction with Intrinsic Thin layer) module while considering in-plane irradiance, ambient temperature, and the module efficiency parameters. The data has been collected every 10 minutes and it will be fed into a machine-learning algorithm to get the results.

Results obtained from the algorithm will be analyzed to achieve a better understanding of the performance changes and the behaviour of the power output and model temperature, under random effects caused by different environmental conditions. The suggested algorithm is not limited to a specified module technology and region.