**SAIP2019** 



Contribution ID: 160

Type: Poster Presentation

## Effects of current mismatch due to uneven soiling on performance of mc-Si module strings

Soiling is the building up of contaminants on the sun facing surface of photovoltaic (PV) modules. These contaminants include dirt, dust, snow, bird droppings and other forms of particulate matter. Uneven soiling causes non-uniform illumination on solar cells which results in unequal current generation in substrings of multi-crystalline Silicon (mc-Si) PV modules. The current mismatch results in the soiled cells operating at abnormally high temperature (hotspot) and causes a negative impact on the power generated by the module and string. Underperformance of PV modules can be revealed when the current-voltage (I-V) parameters deviate from the expected. This work investigates the impact of partial shading due to non-uniform soiling (dust and bird droppings) on the performance of mc-Si modules and strings. The results obtained using a simulating program, PVSim, to model the I-V curves of mismatched substrings and compare with controlled soiling experiments carried out at Outdoor Research Facility (ORF) at Nelson Mandela University and also for strings of mc-Si modules in an operational PV plant for which thermal anomalies were observed. This paper discusses the comparison between the simulation and experimental observations with the effect of defects, causing thermal anomalies, on performance being quantified.

Keywords: Uneven soiling, current mismatch, simulation, performance

## Apply to be<br>be<br>br> considered for a student <br> &nbsp; award (Yes / No)?

Yes

## Level for award<br>&nbsp;(Hons, MSc, <br> &nbsp; PhD, N/A)?

MSc

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Session Classification: Poster Session 1

Track Classification: Track F - Applied Physics