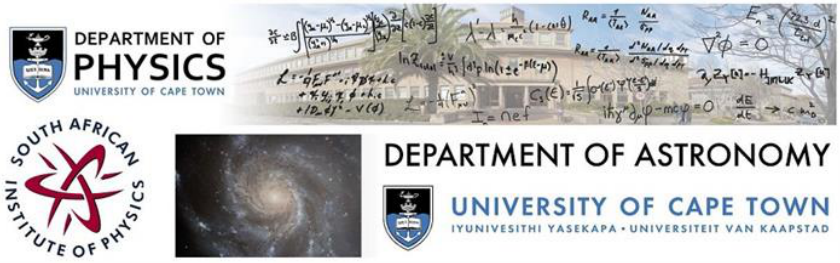

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Effect of Solar tracking on a PV system operating in the CSIR (South Africa)

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Abstract content
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Recently, there has been a renewed interest in solar photovoltaic (PV) tacking systems in the PV industry globally. It has been demonstrated that tracking significantly increases the average yearly energy yield. However, a study on the effect of solar tracking on the performance of PV systems operating in South Africa is rare. The purpose of this study is, therefore, to analyse the operational performance of a 558 kWp ground mounted single-axis tracker solar PV system operating at the CSIR's Pretoria campus with regards to the solar gain compared to a fixed-tilt installation and to prepare the grounds for a subsequent development of a tracking model that will optimise the energy yield. It is observed that on a sunny day the direct normal irradiance accounts for up to 90% of the total irradiation whereas the remaining 10% was from diffused irradiation. During cloudy days, however, nearly all of the solar radiation is from diffused radiation. Over the entire observation period of six months analysed (October 2015 to March 2016), the tracking gain was 20% compared to the global irradiance on the horizontal plane. It is also found that tracking the astronomical movement of the sun cannot be the optimal tracking strategy. Possible explanation for this will be presented and discussed. The results of this study will be used for the subsequent development of an improved tracking algorithm in which the tracking of a solar array would be used such that it optimises total energy yield.

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