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Characterisation of grid tied micro-inverters using a solar array simulator

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Abstract content
 (Max 300 words)

The development of grid tied photovoltaic systems is a rapidly growing market, providing consumers with the opportunity to sell any excess generated energy back to the electrical authority. This makes grid tied systems greatly desirable to any consumer wishing to decrease their electricity bill and worthy of additional research. Although grid tied systems can vary in form, the use of multiple smaller micro-inverters may produce advantages over the use a single large grid tie inverter under partial shaded conditions. In certain array configurations, by attaching a micro-inverter to each individual panel the overall array efficiency can be greatly increased. The aim of this project is to perform electrical characterisation of various micro-inverters by creating a bench top testbed system. The system consists of a solar array simulator module, to simulate the output characteristics of a photovoltaic module, and a variable AC power supply to simulate the 240 VAC, 50Hz supply of the South African electrical grid and an external load. Characterisation of the inverters will be done using a three measurements zone system, the first zone being at the input to the inverter, the second at the output of the inverter and the third on the grid line itself. Additionally a fourth measurement zone may be constructed at the load. This scheme allows for the characterisation of the inverter units with regards to various parameters such as efficiency, output signal quality, accuracy of output signal frequency, phase difference between output and grid signals, energy losses. This will be performed under various solar and environmental temperature conditions.

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