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Solar Panel Modelling through Computational Intelligence Techniques

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Abstract

The efficiency of a solar panel depends on several factors. In particular, the ability to operate in the Maximum Power Point (MPP) condition is required in order to optimize the energy production. The ability to identify and reach the MPP condition is therefore critical to an efficient conversion of the photovoltaic energy. Several techniques to tackle this problem are reported in literature. They differ for the input variables used to compute the MPP as well as the structure of the controller that makes use of the prediction. We focus only on the prediction of the MPP which is related only to the former aspect. In this paper, several computational intelligence paradigms (namely, Fuzzy C-Means, Radial Basis Function Networks, k -Nearest Neighbor, and Feed-forward Neural Networks) are challenged in the task of identifying the MPP power from the working condition directly measurable from the solar panel, such as the voltage, V , the current, I , and the temperature, T , of the panel.

Keywords: Solar panel modelling, Neural Networks, Radial Basis Function Networks, Measurement.

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