Efficiency comparison between different PV array reconfiguration techniques

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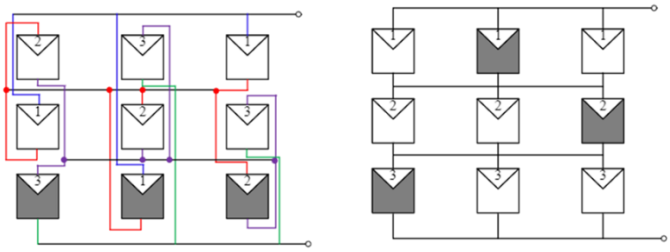
Partial Shading in PV systems is responsible for imbalance current among different PV modules, and power losses. Static of dynamic reconfiguration methods are proposed to mitigate partial shading effects. The static reconfiguration is a one shot layout setting method, while the dynamic one uses a switching matrix to modify regularly the PV configuration.

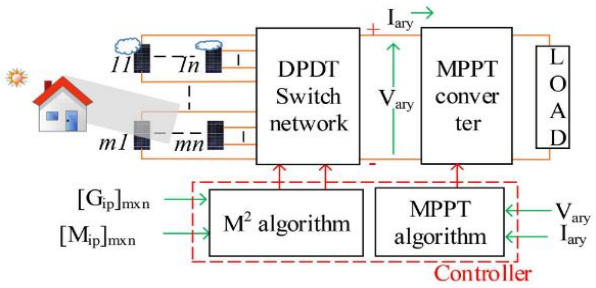
The principle of static reconfiguration method is to distribute, as much as possible, the shadings into different rows. The dynamic reconfiguration method intends to realize the uniformization of the irradiance distribution in each row to balance the row currents (Presented in Fig.1). Both strategies are based on an initial Total-Cross-Tied (TCT) connection of the PV array, which is also proved to be the most robust connection of PVs under partial shading conditions.

This work compares the efficiency of two reconfiguration strategies: Sudoku for the static reconfiguration, and M2 Algorithm for dynamic reconfiguration. They are evaluated in the Matlab-Simulink platform with a 9*9 PV array.

Keywords: Static PV Reconfiguration, Dynamic PV Reconfiguration, Partial Shading Effect, Current imbalance



a) Static



b) Dynamic

Fig.1 Reconfiguration strategies