# Analysis and Design of Photovoltaic Powered Air Conditioners Using Slip-Frequency Control Scheme

*Naser Mohammed Bayoumy AbdelRahim , A. Shaltout*

**Abstract**

This article proposes a new scheme to drive an air conditioner powered by photovoltaic (PV) arrays. The main objective is to reduce the cost of the system, which is a major concern in PV applications. This is achieved by reducing both the initial and running costs of the PV system. Initial cost is cut down by reducing the required size of the PV array through (i) limiting the motor current during both startup and dynamic phases of operation, and (ii) extracting maximum power from the PV array under various metrological conditions by operating the PV array on the maximum power line. Reduction in the running cost of the PV system is achieved by controlling the motor speed such that its slip is kept at a small value at various operating conditions, ensuring highly efficient operation of the system. This article outlines a procedure for sizing the photovoltaic array. Also, the article presents a control strategy that achieves acceptable levels of the motor current with good dynamic response. Simulation results of the system behavior during transient and dynamic phases confirm the capability of the proposed scheme.

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