

Performance Characteristics of PV-Powered DC Shunt and PM Motors Through DC-DC Converter

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Abstract

This paper comprises the dynamical and steady-state characteristics of permanent-magnet and shunt DC motors powered by photovoltaic (PV) cells via DC-DC buck-boost switch mode converter at different solar illuminations. The nonlinearities of the output characteristics of the PV cells and that of the ferromagnetic material of the DC machines are taken into account. The output voltage of the DC-DC converter is automatically controlled via its duty ratio on the hope of keeping a fixed terminal voltage across the terminals of the motor at wide range of operating conditions and solar intensities. At full illumination, the maximum power point of the PV cells are designed to be at the rated conditions of the machines. The results show that the DC-DC buck-boost converter is able to keep constant voltage across the terminals of the motor at wide range of loading conditions and solar illuminations.