Adaptive fuzzy controller based MPPT for photovoltaic systems

ABSTRACT:

This paper presents an intelligent approach to optimize the performances of photovoltaic systems. The system consists of a PV panel, a DC–DC boost converter, a maximum power point tracker controller and a resistive load. The key idea of the proposed approach is the use of a fuzzy controller with an adaptive gain as a maximum power point tracker. The proposed controller integrates two different rule bases. The first is used to adjust the duty cycle of the boost converter as in the case of a conventional fuzzy controller while the second rule base is designed for an online adjusting of the controller’s gain. The performances of the adaptive fuzzy controller are compared with those obtained using a conventional fuzzy controllers with different gains and in each case, the proposed controller outperforms its conventional counterpart.

KEYWORDS

1. PV panel
2. Adaptive fuzzy controller
3. Output scaling factor
4. Fuzzy rules

SOFTWARE: MATLAB/SIMULINK

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BLOCK DIAGRAM:

Fig. 1. Block diagram of the adaptive fuzzy controller.

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EXPECTED SIMULATION RESULTS:

Fig. 2. Comparative study under changing atmospheric conditions.
CONCLUSION:

In this work, an adaptive fuzzy controller is used to track the maximum power point in photovoltaic systems. The gain of the controller is adjusted online by fuzzy rules defined on error and change of error. Simulation results show that the proposed controller can track the maximum power point with better performances when compared to its conventional counterpart. Thus the introducing of an adaptive gain in the structure of conventional fuzzy controllers is well justified.

REFERENCES:


