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The influence of sampling frequency on various MPPT tracking

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Abstract

The use of renewable energy is experiencing a significant growth in the world, with the increasing demand for electric power mainly for the needs of remote, deserted and mountainous regions, the photovoltaic systems, particularly telecommunications and water pumping systems, begin founding great applications.

In this work, we will look on the parameters influencing the MPPT control and governing the operation of these latter.Indeed, the sampling frequency is an important parameter in determining the work done by the command so by the calculator.Therefore a thorough analysis showing the influence of the sampling frequency on the MPPT control is set in the first object.The main interest will be focused on the power ripple caused by oscillations around the PPM and its dependence on the sampling frequency of various technical MPPT and the DC-DC chopper used.Indeed, we have programmed, four MPPT commands: Neural Control, Incrementation of Conductance (IC), P&O command, and improved P&O command, the last three commands give almost the same result in terms of convergence speed, accuracy and ripple rate generated for the same sampling frequency used and the same type of converter, therefore they are indistinguishable.The major problem with these commands is that they present a disturbed response when the sampling frequency increases above a certain threshold, this can be explained by the fact that the system can no longer follow the frequency of work applied from a certain value, therefore it is concluded that the conventional commands have a late response defect from a certain threshold of sampling frequency.To remedy this, we have developed, programmed, and tested a fourth command based on artificial intelligence, which is the command developed using neural networks, it is an new original command proposed by the authors in [1], this predictive control has been tested for the same sampling frequency and the same type of converter as the classical commands, and it turns out that this command is more powerful and more robust in terms of convergence: speed of follow-up, accuracy and rate of ripple, in fact it gives a smooth signal of command and therefore a power devoid of any ripples.The mystery of this command is that it does not depend on the sampling frequency of the system that is because the tracking program which is independent of the frequency of the work of the system and which depends only on the intrinsic parameters of its network (T, S, Vb), therefore it generates smooth signals without any loss.The advantage of this command is that its execution frequency just depends on the working frequency of the processor where it is implemented so a faster control, accurate and a smoother signal of the command, therefore we are planning to propose this command to a real and practical realization that can certainly find its use in solar production plants.

Biography

Wassila ISSAADI is a Doctor of Sciences in Department of Automatics, Electronics, and Electrical Engineering, University of Bejaia, Algeria and received her Doctorat (PhD) degree in September 2016 at the age of 25 years. She obtained Magister degree in 2013, and the diploma of state engineer in 2011. Her current research interests include Robotics, Automatics, adaptives and robust control, Photovoltaics and its Controls, Artificial Neural Network and Fuzzy Logic Theory.

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