PROC. INTERNAT. CONF. SCI. ENGIN. ISSN 2597-5250 | EISSN 2598-232X
Volume 1, October 2017 | Pages: xv-xv

KEYNOTE SPEECH

Review of Maximum Power Point Tracking Control of Photovoltaic Systems in Case of Uniform & Non-uniform Irradiance Conditions

Syafaruddin
Universitas Hasanuddin, Makasar, Indonesia

Abstract. *Syafaruddin. 2017. Review of Maximum Power Point Tracking Control of Photovoltaic Systems in Case of Uniform & Non-uniform Irradiance Conditions. Proc Internat Conf Sci Engin 1: xv-xv.* It is crucial to improve the photovoltaic (PV) system efficiency and to develop the reliability of PV generation control systems. One of the approaches to increase the efficiency of PV power generation system is to operate the PV systems optimally at the maximum power point. However, the PV system can be optimally operated only at a specific output voltage; otherwise the output power fluctuates under intermittent weather conditions. In addition, it is very difficult to test the performance of PV systems controller under the same weather condition during the development process where the field testing is costly and time consuming. For these reasons, the presentation is about the state of the art techniques to track the maximum available output power of photovoltaic systems called maximum power point tracking (MPPT) control systems. This topic could be also one of the most challenges in photovoltaic systems application that has been receiving much more attention worldwide. The talks will cover the application of intelligent techniques by means the artificial neural network (ANN) and fuzzy logic controller scheme using polar information to develop a novel real-time simulation technique for MPPT control by using dSPACE real-time interface system. In this case, the three-layer feed-forward ANN is trained once for different scenarios to determine the global MPP voltage and power and the fuzzy logic with polar information controller takes the global maximum power point (MPP) voltage as a reference voltage to generate the required control signal for the power converter. This type of fuzzy logic rules is implemented for the first time in MPPT control application. The proposed method has been tested using different solar cell technologies such as monocrystalline silicon, thin-film cadmium telluride and triple junction amorphous silicon solar cells. The verification of availability and stability of the proposed system through the real-time simulator shows that the proposed system can respond accurately for different scenarios and different solar cell technologies. In other cases, one of the main causes of reducing energy yield of photovoltaic systems is the partially shaded condition. Although the conventional MPPT control algorithms operate well in a uniform solar irradiance, they do not operate well in non-uniform solar irradiance conditions. The non-uniform conditions cause multiple local maximum power points on the power-voltage curve. The conventional MPPT methods cannot distinguish between the global and local peaks. Since the global power point may change within a large voltage window and also its position depends on shading patterns, it is very difficult to recognize the global operating point under partially shaded conditions. From these reasons, the presentation will address the effectiveness of the proposed MPPT method to solve the partially shaded conditions under the experimental real-time simulation technique based dSPACE real-time interface system for different size of PV arrays, such as 3x3(0.5kW) and 20x3(3.3kW) and different interconnected PV arrays, for instance series-parallel (SP), bridge link (BL) and total cross tied (TCT) configurations.