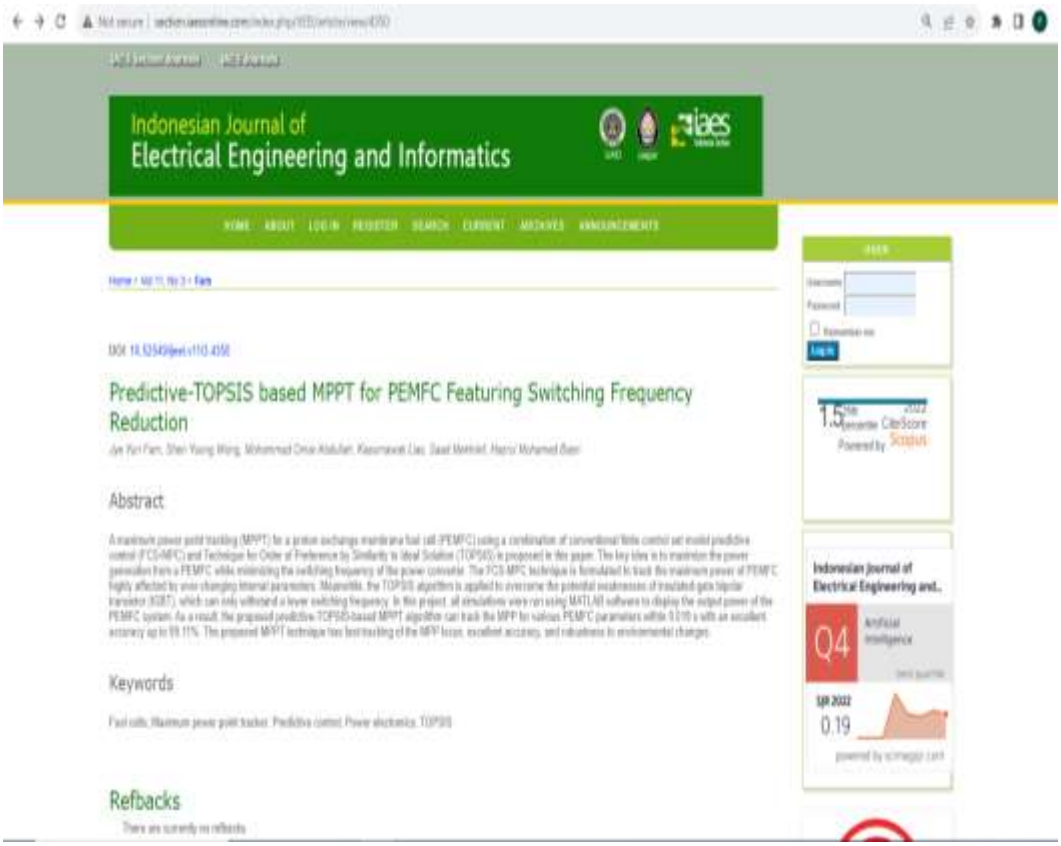

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Predictive-TOPSIS based MPPT for PEMFC Featuring Switching Frequency Reduction

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Abstract

A maximum power point tracking (MPPT) for a proton exchange membrane fuel cell (PEMFC) using a combination of conventional finite control set model predictive control (FCS-MPC) and Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS) is proposed in this paper. The key idea is to maximize the power generation from a PEMFC while minimizing the switching frequency of the power converter. The FCS-MPC technique is formulated to track the maximum power of PEMFC highly affected by ever-changing internal parameters. Meanwhile, the TOPSIS algorithm is applied to overcome the potential weaknesses of insulated gate bipolar transistor (IGBT), which can only withstand a lower switching frequency. In this project, all simulations were run using MATLAB software to display the output power of the PEMFC system. As a result, the proposed predictive TOPSIS-based MPPT algorithm can track the MPP for various PEMFC parameters within 0.2 s with an excellent accuracy up to 99.11%. The proposed MPPT technique has fast tracking of the MPP locus, excellent accuracy, and robustness to environmental changes.

Keywords

Fuel cells; Maximum power point tracker; Predictive control; Power electronics; TOPSIS

Refbacks

There are currently no refbacks.