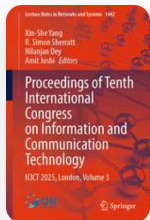


ANFIS–PDLC–Based Real–Time Solar Radiation Controller for Photovoltaic Systems

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Abstract

Solar energy is an inexhaustible source of carbon-free energy worldwide. However solar radiation determines the amount of electrical energy and current that can be produced by solar panels. In this paper, the dynamic regulation of solar radiation using polymer dispersed liquid crystal (PDLC) was studied. It regulates solar radiation that is incident on the solar cell's surface by changing its transparency because of the applied voltage. Thus, researchers

were able to obtain a variable range of solar radiation at the same time and then control the power of the solar cell produced according to the user's request. In the outdoor experiment, the behavior of filtrated radiation in daylight performance under different sky circumstances was assessed by examining solar radiation both with and without a PDLC screen. To simulate the PDLC and forecast solar radiation in real time, the researchers utilized an adaptive neuro-fuzzy inference system (ANFIS). MATLAB program utilized 3.5 W, 25 W, and 100W solar panels. PDLC transparency ranges from 5 to 83%. The results showed that PDLC overall shading on transparent\opaque states are 73% to 37%, respectively, at the same point where PDLC films may regulate the solar cell's output power at a pace of (39.6%, 39.5%, and 42%) of the total cell power for the simulated solar panel, respectively.

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