

Maximum Power Point Tracking for Photovoltaic System under Partial Shading Conditions using Aquila Optimizer Algorithm

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Abstract – The output of photovoltaic (PV) systems can be affected by inconsistent irradiance, temperature, and unexpected weather conditions, classified as partial shading conditions (PSC). To address these difficulties, this work applies an Aquila optimizer algorithm (AO), a bio-inspired meta-heuristic algorithm, to track the multiple-peak P–V curve in PV systems under such PSCs. The results of the AO algorithm were found to be highly efficient, reliable, and precise in normal conditions, PSCs, and fluctuations in irradiance. Additionally, the AO algorithm was shown to have a much better performance when compared to the particle swarm optimization algorithm (PSO) and perturb and observe (P&O) algorithm. The work was validated and executed using MATLAB/Simulink software.

Keywords – Photovoltaic System, Maximum Power Point Tracking MPPT, Partial Shading Condition, Aquila Optimization.