

An Efficient Switching Scheme for Three Phase Multilevel Voltage Source Solar Inverter using a Novel Spatial Group Improvised Border Collie Optimization

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Abstract:
For three phase multilevel solar inverter, choosing an optimal switching scheme remains a significant challenge. Recently, various new pulse width modulation (PWM)-based switching methods have been efficiently used by the researchers for selecting a novel switching scheme. A novel spatial group improvised border collie optimization (sGIBCO)-based efficient switching scheme has been proposed in this paper to reduce the selective order harmonics. The proposed approach optimally determines the switching angles of the multilevel solar inverter, aiming to minimize the total harmonic distortion (THD). A key innovation of the method lies in its spatial group-based improvisation strategy, where sheep are grouped adaptively based on an calculated distance threshold. An eleven level three phase solar inverter serves as test system for validating the methodology. Comparative analysis with particle swarm optimization (PSO) and harmony search (HS) highlights the superior performance of the proposed sGIBCO technique in optimizing switching schemes. The results indicate that the proposed method can effectively guide the design of hardware multilevel inverters with optimal THD performance.

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