

HRES Grid-Connected System Energy Management and Power Quality Improvement

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Abstract

The grid-integrated system's top concerns right now are Power Quality issues. Hybrid Renewable electricity Sources (HRES) are essential for distributed generation to meet the demand for electricity around the world.. The Extended Search Algorithm (ESA) is employed for voltage stabilization, power loss reduction, and energy management. The results of the simulations show that the proposed converter performs better than the traditional PI controller. The MATLAB/ SIMULINK platform is used to run the simulations. Compensates harmonics and unbalances even under distorted supply voltage conditions if the load is associated at the Point of Common Coupling (PCC), which is non-linear or unbalanced and both.

EXTENDED SEARCH OPTIMIZATION PROPOSED TO HRES

The developed system circuit is as shown in Fig.1. Which consists of DG comprising PV-Wind connected to Current Controlled Voltage Source Inverter (CC-VSI)[1] for interfacing to the grid via-an energy-storing DC-link capacitor [2]. By using the ESA, from the PV and Wind more power is extracted. From ESA a mentioned DC link voltage is created [3]. The reference DC link voltage is set to its default value when the solar energy is missing. An inductive filter is connected to the AC-Side of the VSI. To increase the voltage level [4], a step-up transformer is used before the system is connected to the PCC. An uncontrolled rectifier non-linear load is associated at the PCC [5]. To minimize the load current harmonics and power factor and regulate the DG power flow to the PCC an inverter control is used[6].

Block diagram

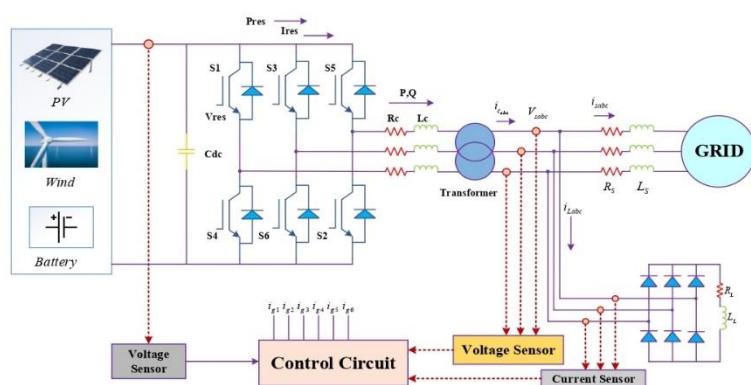
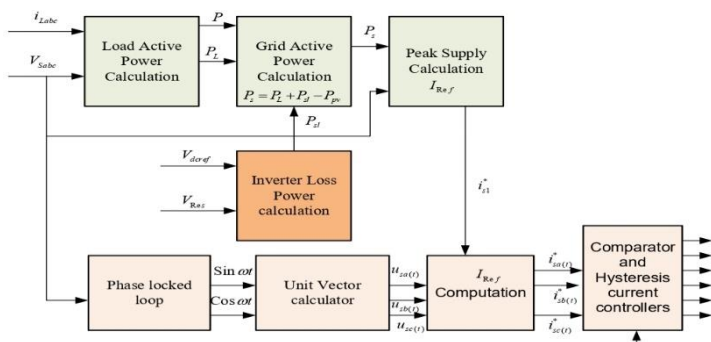


Fig 1- Proposed Block Diagram

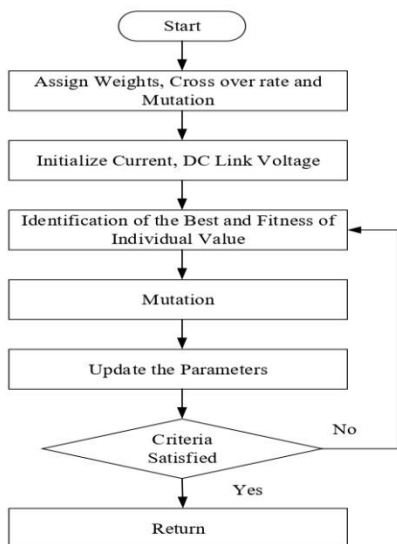
Control diagram



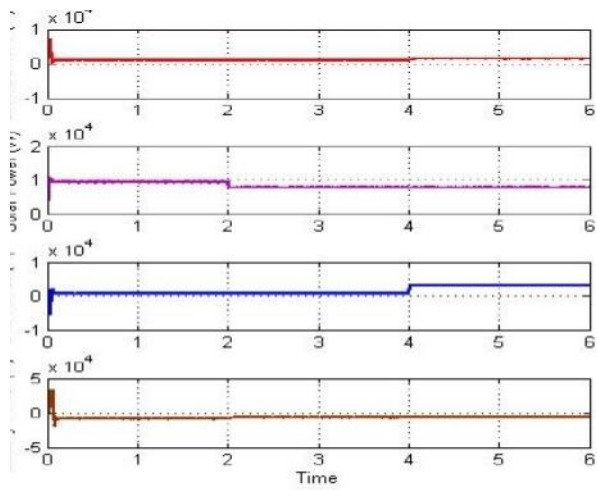
EXTENDED SEARCH ALGORITHM

Generally, ESA is the advanced optimization technique generally applied to crossover, mutation and genetic operators [7]. fed as inputs to the set of guidelines used in ESA. The quality factor is strongly used in the considered set of rules to supply a contemporary individual a set of first-rate men or women used to produce in the crossover operation by considering a fantastic individual part of the person [8]. ESA is utilized to keep a DC-

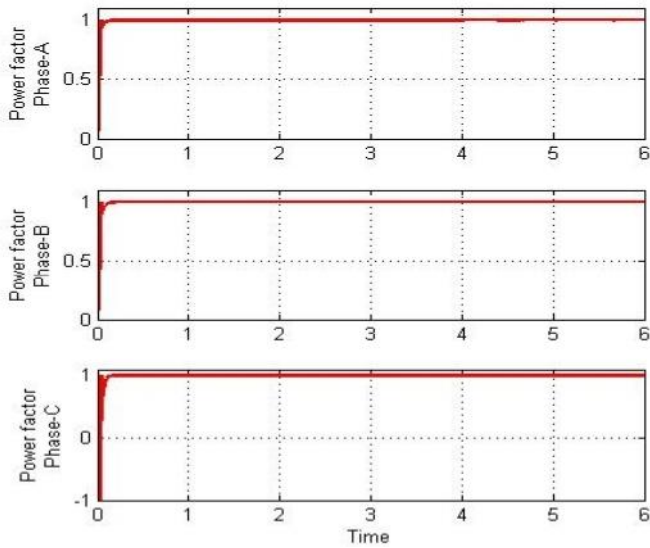
RESULTS AND DISCUSSION



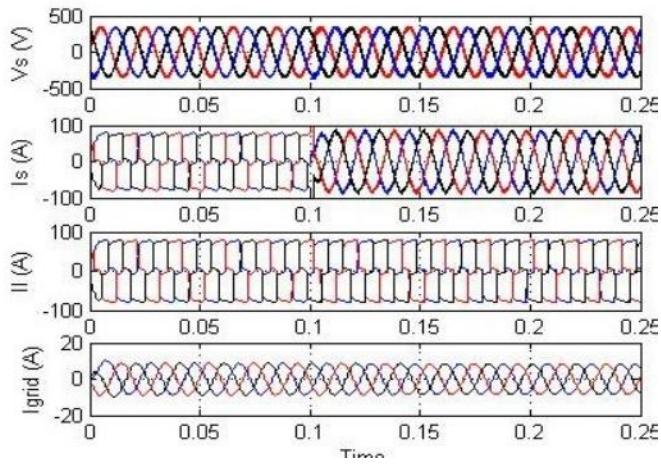
Load demand solar power grid power battery power



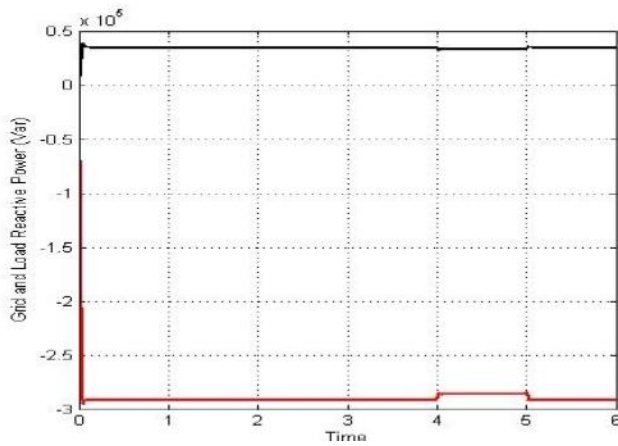
Power factor for inverter load current



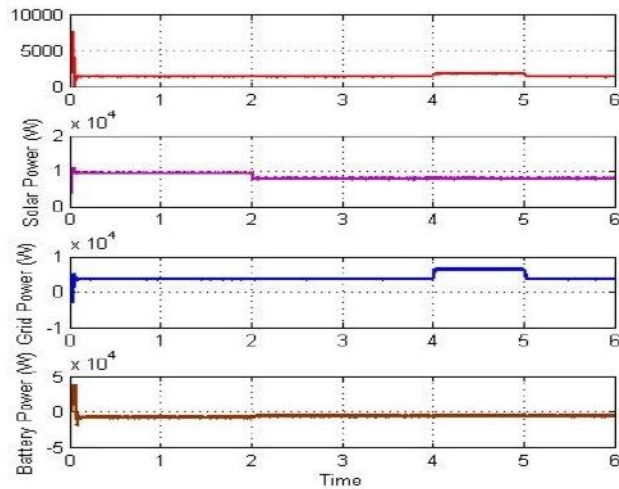
GRID CURRENT LOAD CURRENT INVERTER CURRENT LOAD CURRENT



Active and reactive power for grid load and source



Load power solar power grid power battery power



CONCLUSION

presents the grid integrated solar, wind and battery energy storage system with ESA based CC-VSI by injecting real power for power quality improvement. Energy management is also explained during the unavailability of the sources. Optimizations are predominantly playing an important role in grid integrated systems. The corresponding converters were developed and modelled using MATLAB/SIMULINK

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