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AN ENHANCED POWER SHARING SCHEME FOR VOLTAGE UNBALANCE AND HARMONIC COMPENSATION IN AN ISLANDED AC MICROGRID

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ABSTRACT:
Power sharing issues area unit related to weight unit reactive power, imbalanced power, and harmonic power. An increased droop management methodology through on-line virtual electrical phenomenon adjustment is employed to resolve power sharing problems. weight unit reactive power, imbalanced power, and harmonic power are supplemental to the standard real power frequency droop management. The transient real power variations caused by this area unit wont to notice weight unit series virtual impedance standardization. With the regulation of weight unit virtual electrical phenomenon at an elementary positive sequence, Elementary negative sequence, and harmonic frequencies, a correct power sharing may be complete at the steady state. So as to activate the compensation theme in multiple weight unit units in an exceedingly synchronic manner, a low-bandwidth communication bus is adapted to send the compensation command from a micro grid central controller to weight unit native controllers, without involving any data from weight unit native controllers. The feasibleness of the planned methodology is obtained by simulation results from a low-power three-phase micro grid with 2 parallel weight unit units with identical power rating.
Keywords: Virtual impedance, micro grid, Distributed generation, droop control, islanding operation, renewable energy system, power sharing, voltage control.

1. INTRODUCTION:

In islanding operation, the load demand should be properly shared by parallel metric weight unit units. To facilitate the facility sharing demand while not victimization any communications between metric weight unit units, the important power–frequency and reactive power–voltage magnitude droop management technique is developed. During this management class, real power and reactive power in the power management loop area unit calculated victimization low pass filters (LPF). The reactive power sharing performance is dependent on the electric resistance of metric weight unit feeders. In an exceedingly metric weight unit is provided with dominate inductive virtual electric resistance the reactive power sharing errors may be reduced. Associate improved droop management technique was projected to understand the facility sharing in proportion to metric weight unit power rating. Compared to the quality droop management technique, the facility sharing performance is improved via the measure of a purpose of common coupling (PCC) voltage. Moreover, virtual, real, and reactive power idea was introduced to boost the steadiness of droop management. Similarly, the idea of virtual frequency and virtual voltage magnitude idea was conjointly projected to forestall instability operation of islanding micro grids. A central controller is enforced at a micro grid to observe the PCC voltage or load/grid current. These measured steady state PCC signals area unit modulated to dc quantities at their corresponding synchronous rotating frames. At every metric weight unit native controller, dc

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signals area unit switched back to ac signals by some signal demodulators. A vital of this technique is that harmonic signals may be transmitted to a metric weight unit native controller by employing a low bandwidth communication system with around one thousand cycles per second oftenest. To spot the reactive power sharing error while not measurement PCC voltage, the important power, and reactive power management area unit coupled by employing a changed droop control. Once the reactive power sharing errors area unit detected, it may be eliminated by employing a straightforward intermittent integral term that adjusts the metric weight unit voltage magnitude. For associate islanding micro grid with an outsized variety of nonlinear or imbalanced hundreds, developing a schematic compensation technique to understand correct reactive, imbalance, and harmonic power sharing is incredibly necessary. In this paper, associate adaptation virtual electric resistance management technique is applied to metric weight unit units in islanding micro grids. The virtual electric resistance at an elementary positive sequence, Elementary negative sequence, and harmonic frequencies area unit determined in keeping with transient real power variations. To activate touch of transient power variations, a transient management term is accessorial to the standard real power–frequency droop management. Through interactions between real power variations and therefore the virtual electric resistance regulation, a micro grid reactive power, imbalance power, and harmonic power sharing errors may be salaried at the steady state.

2. MICROGRID POWER SHARING:

The diagram shows a simplified diagram of associate degree islanding micro grid, wherever many decigram units area unit integrated into the micro grid with LC filters. For every decigram unit, the backstage power is provided by a RES or an energy storage system. To modify the discussion, associate degree infinite dc link with fastened dc voltage is assumed during this paper. There are a unit many linear, imbalanced, and harmonic hundreds placed at the PCC. A micro grid central controller is additionally placed at PCC. To comprehend the planned compensation theme in decigram units in an exceedingly synchronized manner, a central controller is adapted to send synchronized compensation flag signals to decigram native controllers.

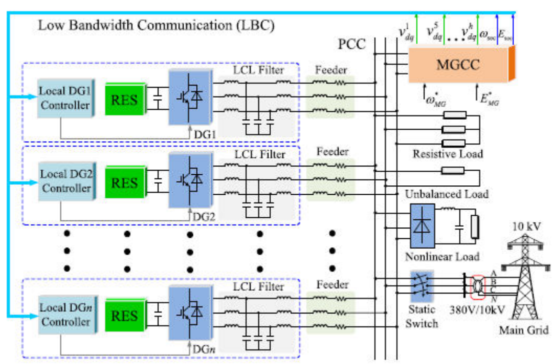

Fig.2.1. Diagram of an islanding micro grid with one way low bandwidth communication.

3. HARMONICS ELIMINATION:

The free fall generated by the selective virtual electrical phenomenon loop, the facility controllers, the selective harmonics compensation of PCC, the UHC block, and the reference price that area unit regulated by the proportional and multi-resonant controllers (P+MRC) to come up with references for the current loop. The reference current signals area unit then compared with the corresponding electrical converter currents, and area unit regulated by a proportional controller to supply voltage commands. Moreover, so as to activate the compensation strategy in multiple parallel-connected decigram units synchronously, the

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LBC bus is used to send the compensation command from the MGCC to the native decigram controller, together with the secondary management and auxiliary management. The projected stratified management ways are bestowed as follows.

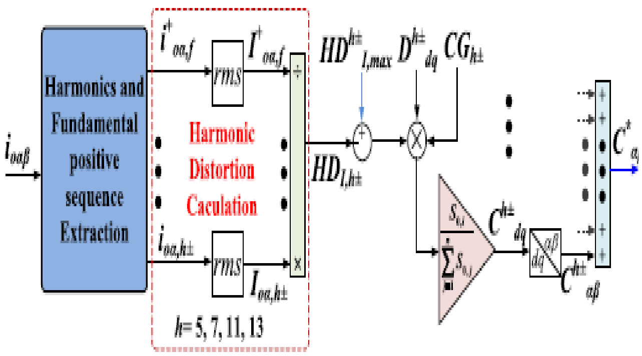

Fig.3.1. Block diagram of the compensation effort controller.

4. SIMULATION RESULTS:

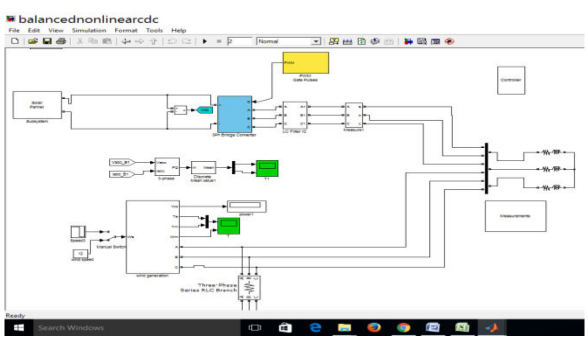

Fig.4.1.Simulation circuit.

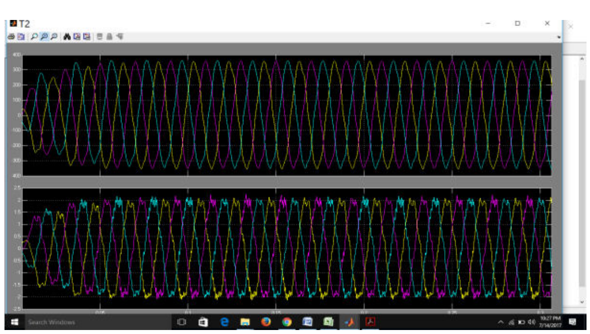

Fig.4.2.voltage and current across the solar panel.

Simulation waveforms in fig eleven show a small grid with generalized PCC hundreds for DG1 and DG2. Associate unbalanced RL load and a three-phase diode rectifier square measure connected to PCC at constant time. To cut back the small grid power sharing errors, the compensation drained reactive power compensation, imbalance power compensation, and harmonic power compensation; it's seen that the planned methodology is effective to deal with the ability sharing errors in an exceedingly small grid with generalized hundreds.

5. CONCLUSION:

This paper discusses AN increased power sharing theme for islanding micro grids. The projected technique utilizes the frequency droop because the link to compensate reactive, imbalance, and harmonic power sharing errors. Specifically, the frequency droop management with extra disturbance is employed to provide some real power sharing variations. These real power variations are wont to regulate the metric weight unit virtual impedances at the basic positive sequence, basic negative sequence, and harmonic frequencies. With the interactions between the transient frequency droop management and the variable metric weight unit virtual holmic resistance, the impact of unknown feeder impedances will be properly remunerated and an accurate power sharing is achieved at the steady state. Comprehensive simulated results from a low-tension micro grid give effectiveness of the projected theme.

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