(1)

Ramptime Current -Controlled APF for Harmonic Mitigation, Power Factor Correction and Load Balancing

Mazen Abdel-Salam, Adel Ahmed, Mohamed Abdel-Sater

Abstract:

This paper presents a simulation for a shunt active power filter aimed at mitigation of harmonics, power factor correction and balancing of unbalanced three-phase system. The system consists of load fed though a six pulse bridge rectifier. The active power filter consists of a three-phase currentcontrolled voltage source inverter (CC-VSI) with a filter inductance at the ac output and a dc-bus capacitor. The CC-VSI is operated to directly control the ac source current to be sinusoidal and in phase with the ac source voltage. The inverter switching is controlled using ramptime current control being based on the concept of zero average current error (ZACE). The active power filter reference currents are generated using perfect harmonic cancellation (PHC) control method. The proposed filter successfully succeeded in reducing the total harmonic distortion (THD) to less than unity, correcting power factor to unity and balancing of unbalanced currents under sinusoidal and distorted supply voltages. The dynamic performance of the proposed filter is so fast to meet the dynamic load conditions.

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Proceedings of the 14th International Middle East Power Systems Conference (MEPCON10) , , PP.144-150

(2)

Harmonic Mitigation, Maximum Power Point Tracking, and Dynamic Performance of Variable-speed Grid-connected Wind Turbine

Mazen Abdel-Salam; Adel Ahmed; Mohamed Abdel-Sater

Abstract:

This article presents a method for harmonic mitigation and maximum power point tracking for a variable-speed grid-connected 20-kW wind turbine. The wind energy conversion system consists of a permanentmagnet synchronous generator driven by variable-speed 20-kW wind turbine. The output of the permanent magnet synchronous generator is connected to a single-switch three-phase boost rectifier to generate DC voltage, which feeds a current-controlled inverter to interface the system with the electric utility. The single-switch three-phase boost rectifier is an active power factor correction technique to maintain the power factor at the permanent magnet synchronous generator side to nearly unity and mitigate the permanent mag- net synchronous generator current harmonics. To mitigate inverter output current and voltage harmonics, an LCL filter has been used. A complete analysis of the harmonic content has been done everywhere in the system. The results show that the proposed maximum power point tracking control strategy succeeded to track the maximum wind power irrespective of the wind speed. This strategy in presence of an LCL filter achieved harmonic mitigation at the permanent magnet synchronous generator and inverter output sides. The dynamic response of the wind energy con- version system is tested under a three-phase fault condition. For comparison pur- poses, an active power filter is designed and checked against the single-switch three-phase boost rectifier for harmonic mitigation at the permanent magnet synchronous generator side.

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(3)

Steady-state Modeling and Control of a Microgrid Supplying Irrigation Load in Toshka Area

Mazen Abdel-Salam, Adel Ahmed, Hamdy Ziedan, Rashad Kamel, Khairy Sayed, Mahmoud Amery and Mohamed Swify

Abstract:

This paper is aimed at sizing solar-wind-battery standalone microgrid for supplying irrigation and domestic loads in Toshka area, Toshka, Egypt. Not only the MG system components but also the interconnection cables and feeders are sized. Steady-state power flow through the MG system is analysed at varying sun irradiation and wind speed. Modeling of the MG components and their control of system voltages, currents and powers are investigated. Power flows during different MG operation conditions including absence of wind and sun as well as sudden disconnection of the load are studied

Keywords:

Hybrid Solar-Wind , Irrigation System , Toshka Area , control system , power flow

Published In:

IECON 2012 - 38th Annual Conference on IEEE Industrial Electronics Society , , 6

(4)

Harmonic Mitigation and Maximum Power Point Tracking for Variable Speed Grid Connected

Mohamed Abdel-Sater Swify

Abstract:

This paper presents a method for harmonic mitigation and maximum power point tracking (MPPT) for a variable speed-grid connected 20 kW wind turbine. The wind energy conversion systems consist of permanent magnet synchronous generator (PMSG) driven by variable-speed 20 kW wind turbine. The output of the PMSG is connected to a single switch three-phase boost rectifier to generate DC voltage which feeds a current controlled inverter to interface the system with the electric utility. The single switch three-phase boost rectifier is an active power factor correction technique to maintain the power factor at the PMSG side to nearly unity and mitigate the PMSG current harmonic. To mitigate inverter output current and voltage harmonics, an LCL filter has been used. A complete analysis of the harmonic content has been done everywhere in the system. The results show that the proposed MPPT control strategy succeeded to track the maximum wind power irrespective of the wind speed. This strategy in presence of LCL filter achieved harmonic mitigation at the PMSG and inverter output sides

Keywords:

machine control; maximum power point trackers; permanent magnet generators; power convertors; power factor correction; power harmonic filters; rectifying circuits; synchronous generators; wind turbines; LCL filter; MPPT control strategy; active power factor correction ;grid connected wind turbine; harmonic mitigation; maximum power point tracking; maximum wind power; permanent magnet synchronous generator; power 20 kW; three phase boost rectifier; variable speed wind turbine; wind energy conversion system; Active filters; Harmonic analysis; Inverters; Power harmonic filters; Rectifiers; Switches; Wind turbines; Harmonic mitigation; MPPT;PMSG; Variable speed wind turbine; power electronics

Published In:

Energy Conference and Exhibition (EnergyCon), 2010 IEEE International , , 5

(5)

Design and Implementation of Stand-alone Residential PV System

Mazen Abdel-Salam, Adel Ahmed, Mahmoud Amery, Mohamed Swify, Ahmed El-kousy, Khairy Sayed

Abstract:

This paper is focused on construction of a stand-alone residential 2-kW centralized PV system to feed different domestic loads at a home including lighting loads, washing machine, TV, refrigerator and computer. The stand-alone residential 2-kW PV system consists of PV generator, storage batteries, charge regulator, inverter, filter and maximum power point tracking control system. The paper in steps includes PV modeling, software development for monitoring storage batteries, development of maximum power point tracking controller, design and implementation of an inverter and use of a filter to improve the inverter output waveform.

Keywords:

PV system, residential load, inverter, filter

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Applied Electrical Engineering and Computing Technologies (AEECT), 2011 IEEE Jordan Conference on , , 6

(6)

Finite set model predictive control with on-line parameter estimation for active frond-end converters

Abdelrahem, Mohamed; Hackl, Christoph Michael; Kennel, Ralph

Abstract:

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Keywords:

NULL

Published In:

Electrical Engineering , v 100, n 3 , p 1497-1507

Implementation and experimental investigation of a sensorless field-oriented control scheme for permanent-magnet synchronous generators

Abdelrahem, Mohamed; Hackl, Christoph Michael; Kennel, Ralph

Abstract:

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Keywords:

NULL

Published In:

Electrical Engineering , v 100, n 2 , p 849-856

(8)

Robust Predictive Control for Direct-Driven Surface-Mounted Permanent-Magnet Synchronous Generators Without Mechanical Sensors

Abdelrahem, Mohamed; Hackl, Christoph M.; Zhang, Zhenbin; Kennel, Ralph

Abstract:

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Keywords:

NULL

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IEEE Transactions on Energy Conversion , v 33, n 1 , p 179-189

(9)

Finite Position Set-Phase Locked Loop for Sensorless Control of Direct-Driven Permanent-Magnet Synchronous Generators

Abdelrahem, Mohamed; Hackl, Christoph M.; Kennel, Ralph

Abstract:

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Keywords:

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IEEE Transactions on Power Electronics , v 33, n 4 , p 3097-3105

Fault-ride through strategy for permanent-magnet synchronous generators in variable-speed wind turbines

Abdelrahem, Mohamed; Kennel, Ralph

Abstract:

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Keywords:

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