

How to suppress oscillation in grid-connected inverter system?

To suppress the oscillation, a control parameters design method of the grid-connected inverter is proposed. Without changing the control method, the proposed control parameters design method can ensure the stable operation of the grid-connected inverter system under the very weak grid condition when the short-circuit ratio (SCR) is 2.

Which PID controller is best for grid-connected PV converter system?

Several variants of PID controllers have been reported in the literature for grid-connected PV converter system such as digital PI control (Selvaraj, Rahim, and Krismadinata 2008), optimal PID control (Arzani, Arunagirinathan, and Venayagamoorthy 2015), and fuzzy PI controller (Karbakhsh et al. 2016).

Can artificial ecosystem optimization improve PI controller parameters for a grid-connected photovoltaic system?

In this research, we suggested and put into practice the Artificial Ecosystem Optimization (AEO) algorithm to fine-tune the PI controller parameters for a grid-connected photovoltaic (PV) system, aiming to enhance the system's power quality, stability, and overall performance through dynamic real-time adjustments.

What is a PI controller?

By utilizing the PI controller, the current controller ensures that the current remains accurate and aligned with the desired reference values, thereby enhancing power quality in the grid-connected system. PI controllers are a type of control loop that employs linear parameters and is commonly used in load-dependent processes.

Are control parameter design methods useful for inverters?

Therefore, researching control parameter design methods for inverters holds significant theoretical and practical engineering value. Three-phase LCL-type inverter features advantages such as small volume, effective suppression of high-frequency harmonics, and high-power density. Currently, it is widely used in new energy systems [4,5].

How are PI controller parameters optimized?

The PI controller's parameters are optimized by minimizing the error between the current controllers and the voltage regulator, employing the Artificial Ecosystem algorithm. The objective function and limitations of the Artificial Ecosystem algorithm are further discussed.

In this article, a novel control method of the grid-connected inverter (GCI) based on the off-policy integral reinforcement learning (IRL) method is presented to solve two-stage three-phase ...

Abstract-- The number of grid-connected inverters is growing due to the expansion of the use of renewable

energies (RE) systems and this may affect grid power quality and stability. Some control algorithms reduce injected current harmonics and add new possibilities to the converter. This paper implements and analyses the proportional integral (PI)

Current control: the PI controller is used with the feed-forward technique of the grid voltage as shown in Fig. 13. ... and acting on the phase shift between grid voltage and inverter output voltage as a control parameter, The proposed control strategy is capable to control, not only the current injected into the grid, but also the power factor ...

Small-signal stability problems often occur when the inverter for renewable energy generation is connected to weak grid. A small-signal transfer function integrated model reflecting the interaction of grid impedance, phase locked-loop (PLL), and current control loop is established in this paper. Based on the established model, the oscillation mechanism of the grid ...

Fig.7 Simulink model of grid connected single phase inverter with controller Parameter Table 2: inverter and grid parameters Fig.8: Steady state a)grid voltage b)grid current c)inverter current . Value V_g -Grid voltage 220v RMS f -- Grid frequency 50Hz V -DC voltage 400 Li- inverter side inductor 15.7mH

In this paper we investigate the influence of the grid impedance, and various control parameters of a GFM inverter with PI current controllers and virtual impedances, and give recommendations for ...

represents the proportional and integral coefficients of same PI controller respectively. IV.GRID-TIED INVERTER WITH CONVENTIONAL PI CONTROLLER To check and realise the performance of the above proposed PI control method, a fixed-step MATLAB/SIMULINK environment is created. Inverter is realised with Fast switching IGBTs ...

Under balanced three-phase system conditions, various conventional control methods were applied for controlling a grid-connected three-phase inverter, such as proportional-integral (PI) controller and proportional-resonant (PR) controller. The grid can become imbalanced for a variety of causes, including single-phase loading and single-phase renewable energy ...

The controllers that are used are classic PI controllers and inverter is working in current control mode. A low pass filter is used for interconnection of inverter to the grid which is mainly LCL filter and depending on control way, there are four control strategies. ... The controller parameters of the inner and outer control loops are ...

The PI regulation of voltage and current double closed-loop control is the standard control technique for grid-connected inverters. However, the control effect of the PI regulator often depends on the precision of the established system mathematical model. For the nonlinear and strongly coupled system of the grid-connected inverter ...

The grid-connected three-phase inverter was controlled using a variety of control techniques under balanced grid scenarios, such as proportional-integral (PI) and proportionalresonant (PR) control ...

The PI-DR current controller ensures that the PV grid-connected inverter can realize normal grid-connected operation and improves the quality of the power when an asymmetrical fault occurs in the ...

This mostly affects control parameters, rather than the choice of a specific control system. ... There are some key criteria to consider when evaluating the performance of grid-connected inverter control methods: the power quality allows to evaluate the distortion in the current and voltage waveforms to ensure compliance with grid standards ...

The work focuses on LCL-type grid-connected inverters and addresses the issues of the cumbersome traditional PI control parameter design method, which involves iterative tuning and lacks the ability for multi ...

RESEARCH ARTICLE Particle swarm optimization algorithm-based PI inverter controller for a grid-connected PV system M. F. Roslan ID 1*, Ali Q. Al-Shetwi ID 2,3, M. A. Hannan ID 1, P. J. Ker2, A. W. M. Zuhdi2 1 Department of Electrical Power Engineering, Universiti Tenaga Nasional, Kajang, Selangor, Malaysia, 2 Institute of Sustainable Energy, Universiti Tenaga Nasional, ...

The vector current control was tested with a grid-connected inverter. A current reference step on both the d-axis and the q-axis was performed in simulation and experimental modes. The following graphs show a comparison between both results: Vector current control behavior in a three-phase inverter

A 2.1 kW grid-connected photovoltaic (PV) system with a single-phase configuration is developed in MATLAB/Simulink to apply a proposed firefly algorithm for optimizing the PI and PR controller parameters in the inverter control strategy.

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