Photovoltaic inverter bifurcation

Environmentally-Friendly, Grid-connected Photovoltaic Energy System, 30. Bifurcation Phenomenon. 31. 2 . 32 . ... quadratic boost converter loaded by a gridinterlinked DC- -AC inverter was studied ...

In high-power photovoltaic systems, the inverter with an LCL filter is widely used to reduce the value of output inductance at which a lower switching frequency is required. However, the effect on the stability of the system caused by an LCL filter due to its resonance characteristic cannot be ignored. This paper studies the stability of a single-phase voltage ...

Aiming at the rich bifurcation and chaotic characteristics in the inverter with proportion integral derivative (PID) controller, the discrete iterative model of such an inverter was derived based on the stroboscopic mapping theory; the nonlinear evolution and the cause of instability in this inverter are analyzed.

This work presents the discrete-time approach in modeling switching converters, and provides an convenient means of predicting stability boundaries so as to facilitate the design of inverter. This paper describes the fast-scale bifurcation phenomenon of a voltage-mode controlled full-bridge inverter which is widely used in AC power supply applications. Main ...

Due to the traditional grid-connected current control method of single Proportional Integral (PI) and Repetitive Control (RC) strategies, the photovoltaic inverter output current will have a distortion problem, which can not only maintain the stability of the whole photovoltaic system, but also the current quality of the photovoltaic inverter grid-connected system is ...

The bifurcation diagram for ? ? [-1, 1] with U pv = 300 is shown in Fig. 3, which shows that as the value of correlation factor increases, inverter system is driven in period sequence to chaotic state. Fig. 4 a shows the control result when ? = 0. But Fig. 4 b is the control result with ? = -0.3. As can be seen from Fig. 4, when the controller is put into effect, the ...

The influence of photovoltaic (PV) output with stochasticity and uncertainty on the grid-connected system"s voltage stability is worth further exploration. The long-term voltage stability of a 3-bus system with a large ...

The single-phase photovoltaic energy storage inverter represents a pivotal component within photovoltaic energy storage systems. Its operational dynamics are often intricate due to its inherent ...

In, second order PV inverter controlled in proportion with the current loop has been presented. The results showed that selecting the circuit parameters is important to achieve a stable state. In, by changing the U pv, various chaotic and inverter bifurcation behaviors were investigated. The effect of changes in other inverter parameters on ...

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Operating with natural convection cooling, this PV inverter achieves 98.0% efficiency at 60% of load and 97.8% efficiency at full load. The power density of the packaged PV inverter is $5.8W/inch^3$.

In this paper, a deep investigation of a single-phase H-bridge photovoltaic energy storage inverter under proportional-integral (PI) control is made, and a sinusoidal delayed feedback control (SDFC) strategy to mitigate ...

In order to design a photovoltaic inverter with excellent performance, the second-order photovoltaic inverter circuit model under current loop proportional control is established in this paper ...

The bifurcation analysis reveals a super-critical Hopf bifurcation, linked to the level of generation from grid-following PV inverter, as the main limiting factor of the feasible operating region. The particular mode (eigenvalue) that exhibits the instability is associated with the SG"s field and stator flux.

analysis of nonlinear behaviors, such as bifurcation and chaos [1, 2]. In power electronic devices, inverters play a key role in energy transfer. Inverter technology is a core technology of photovoltaic power generation systems. The nonlinear behavior research of DC/AC inverters started at the beginning of the 21st century.

Request PDF | Research of Photovoltaic Grid System Voltage Stability Based on the Bifurcation Theory | In grid-connected photovoltaic system, the inverter, grid device, power electronic devices etc.

This paper studies the stability of a single-phase voltage source full-bridge inverter with an LCL filter through the bifurcation theory as it is a nonlinear system. The simulation results show that low-frequency oscillation ...

The experimental results show that as k pv decreases, the photovoltaic inverter enters the slow-scale state caused by Hopf bifurcation. With the control method proposed in this paper applied, the slow-scale nonlinear behavior is effectively controlled, and the system rapidly restores to steady state operation.

The study expands the range of research on the bifurcation and chaos from the inverter with proportional controller to the inverter with PI controller, and makes a further study for the ...

This article proposes a single-stage, single-sourced ACHB trinary inverter topology without presources. Then, a control strategy using unity horizon length finite-control-set model ...

A single-stage, single-sourced ACHB trinary inverter topology without presources is proposed and a bifurcation analysis-based design is proposed to eliminate the undesirable harmonics and chaos operation in the FCS-MPC closed-loop operation. Asymmetric cascaded H-bridge (ACHB) trinary inverter has several advantages, such as high efficiency due to high ...

Aiming at the slow-scale nonlinear behaviors of a dual-loop control H-bridge photovoltaic inverter, a

slow-scale nonlinear control method based on time-delay feedback control is proposed. ... The theoretical analysis shows that the fast-scale instability manifests itself as a period-doubling bifurcation occurs, which reveals the intrinsic ...

There are complex nonlinear behaviors such as bifurcation and chaos in a single-phase H-bridge photovoltaic inverter under proportional integral control, which will increase the harmonic content ...

Electronics 2024, 13, 2854 3 of 20 applications in photovoltaic energy storage inverters. Section 6 validates the effectiveness and accuracy of the SDFC strategy through a simulation.

We find that this inverter can exhibit multiperiod bifurcation, tangential bifurcation and paroxysmal chaos within certain ranges of control coefficients and other circuit parameters, which will influence the system"s stability seriously. On the basis of this discovery, the sinusoidal time-delay feedback control method is proposed.

In this paper, the piecewise smooth state equation of a two-stage photovoltaic grid-connected (TPG) inverter is established and studied; based on the solution to the piecewise smooth state ...

It was observed that the low-frequency oscillation following instability was due to the Hopf bifurcation, which will decrease the power supplied quality by the inverter. To address ...

Download Citation | Study of bifurcation and chaos for photovoltaic inverter with PI controller | Regarding the photovoltaic (PV) inverter which uses current control method with PI controller as ...

We find that this inverter can exhibit multiperiod bifurcation, tangential bifurcation and paroxysmal chaos within certain ranges of control coefficients and other circuit parameters, which will ...

The research shows that the predictive controller parameters are closely related to the bifurcation and chaos behaviors of the grid-connected photovoltaic inverter, and can be used to guide the modeling, stability analysis, and optimization design of photvoltaic grid- connected inverters. A photovoltaic grid-connected inverter is a strongly nonlinear system. A ...

In this paper, the single-phase full bridge photovoltaic (PV) grid-connected inverter is introduced. Based on the working principle and circuit theory, the corresponding dimensionless mathematical ...

An inverter, whose inductor current is periodic, is the key equipment for photovoltaic power generation, fuel cell power generation, etc. A nonlinear inductor, whose inductance will be changed by ...

Liu, Yuwen ; Wang, Tao ; Wang, Xijun et al. / Stabilizing Switching Control for DC- DC Converter in Two-Stage Photovoltaic Grid Connected Inverters. 2018 International Conference on Information, Cybernetics, and Computational Social Systems, ICCSS 2018. Institute of Electrical and Electronics

Engineers Inc., 2018. pp. 387-392 (2018 International Conference on ...

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