
Grid-connected inverter DC saturation

Do grid-forming converters have transient stability conditions under current saturation?

Transient stability conditions are established for current-saturated grid-forming converters. In this paper, we investigate the transient stability of a state-of-the-art grid-forming complex-droop control (i.e., dispatchable virtual oscillator control, dVOC) under current saturation.

Can current saturation destabilize grid-forming converters?

Current saturation can destabilize grid-forming converters since it leads to current-dependent variable impedance. Saturation information is fed back to the controller to ensure transient stability under current saturation. Transient stability conditions are established for current-saturated grid-forming converters.

Can a saturation-informed current-limiting control maintain transient stability under current saturation?

The saturation-informed current-limiting control for GFM converters is able to maintain transient stability under current saturation, unlike the conventional complex-droop GFM control strategy, as seen in the comparative simulation results in Fig. 7. 4.3. Case study III: IEEE 9-bus test system

How do we quantify the saturation level of a converter?

We quantify the saturation level of a converter by introducing the concept of degree of saturation (DoS), and we propose a provably stable current-limiting control with saturation-informed feedback, which feeds the degree of saturation back to the inner voltage-control loop and the outer grid-forming loop.

This study introduces an improved modulated model predictive control (IM2PC) method for grid-connected inverters. By utilizing a fixed-time observer (FTO), the proposed ...

In this paper, we investigate the transient stability of a state-of-the-art grid-forming complex-droop control (i.e., dispatchable virtual oscillator control, dVOC) under current ...

The operation of grid-tied single-phase inverters generates oscillations in its DC link voltage. If only active/reactive power is controlled by the inverter, this oscillation is at twice the ...

This paper presents a short-circuit analysis of grid-connected photovoltaic (PV) power plants, which contain several Voltage Source Converters (VSCs) that regulate and ...

We quantify the saturation level of a converter by introducing the concept of degree of saturation (DoS), and we propose a provably stable current-limiting control with saturation ...

Description This reference design implements single-phase inverter (DC/AC) control using a C2000™ microcontroller (MCU). The design supports two modes of operation ...

An adaptive neural network (NN) based optimal saturation control scheme is investigated for single-phase grid-connected photovoltaic (PV) systems by incorporating ...

Since the output of the photovoltaic (PV) array is DC voltage and the grid voltage is AC voltage, the grid-connected inverter is used to realize DC-AC conversion as well as grid ...

Under grid voltage sags, over current protection and exploiting the maximum capacity of the inverter are the two main goals of grid-connected PV inverters. To facilitate low ...

Abstract Grid-forming converters (GFCs) are pivotal in maintaining frequency and voltage stability in

modern distribution systems. However, a critical challenge arises when ...

The use of the saturation-informed control strategy in multi-converter grid-connected systems or multi-converter islanded microgrids, during current saturation, leads to an ...

This article analyzes the influence of the saturation limiter used with dc-link voltage control (DVC) on the transient stability of grid-forming (GFM) inverters and proposes a flexible ...

This brief proposes a new current saturation strategy (CSS) for grid-forming (GFM) inverters to comply with the existing low-voltage ride-through (LVRT) capability requirements.

The integration of photovoltaic (PV) systems into weak-grid environments presents unique challenges to the stability of grid-connected inverters. This review provides a ...

An adaptive-saturation module is proposed to enhance the transient stability of grid-following inverters after voltage-dip inception or voltage-dip fault clearance moment. The ...

I. INTRODUCTION Transformer less grid connected inverters are widely used because of their high efficiency, small size and mass. However, the dc current offset ...

The LCL-type grid-connected inverter with capacitor current feedback active damping and its control structure under digital control are depicted in Fig. 2. In this figure, V_{in} ...

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