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Grid-connected inverter DC saturation

Overview

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.

How is a grid connected to an inverter?

The inverter is connected to the grid using a typical LC filter and a coupling transformer. The grid is represented as its Thévenin equivalent circuit, with a grid impedance Z g and a voltage source v g.

How does a high saturation inverter work?

At high saturation levels, the exchanged active power will only be limited by the filter and virtual impedance. Depending on the voltage sag depth and current capabilities of the inverter, a stable operation point can be achieved.

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Fig. 12 shows the simplified equivalent circuit of a grid-connected GFM inverter, modelled using two voltage sources and an equivalent impedance Z e q. Initially, the system is ...

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 ...

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 ...

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 ...

Index Terms--Controller saturation, constant-amplitude oscillation, describing function, grid-connected inverter, stability.

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 ...

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Due to the disparity of power modules, asymmetry of driving pulses and measurement errors of sensors, dc currents may be injected to grid-connected photovoltaic ...

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

IN a grid connected inverter, if DC bus is utilized close to 100%, duty cycle saturation issue may cause distortion on the grid side. Also the control loop will be deteriorated ...

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