

## ContainerPower Energy Solutions

# Inverter grid-connected oscillation



## Overview

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In this paper, considering the solvability of reference current matrix equation, the inherent mechanism of inverter output power oscillation is analyzed, and a modified topology with auxiliary modules inserted in series between the inverter output filter and the point of common coupling (PCC) is proposed. Do grid-following and grid-forming inverters have a new oscillation phenomenon?

The dynamic equations of FOs in GFM converters are derived analytically. The key parameters influencing FOs in GFM converters and their impact patterns are analyzed. This paper identifies a new oscillation phenomenon in hybrid systems composed of grid-following (GFL) and grid-forming (GFM) inverters.

How to eliminate output power oscillation of grid-connected inverter under unbalanced grid voltage?

At present, the main methods to eliminate the output power oscillation of grid-connected inverter under unbalanced grid voltage can be divided into two categories: the first type is to improve the control strategy; the second one is to change the topology of the inverter.

Why do inverter control systems oscillate?

These oscillations are often driven by the interactions between inverter control systems, specifically the PLL, and grid impedance, necessitating advanced solutions to ensure stable operation in high renewable energy penetration scenarios [5, 6].

Does a grid-connected inverter have a low-frequency oscillation?

The issue of low-frequency oscillation (LFO) becomes more prominent when considering the phase-locked loop (PLL) impact of grid-connected inverter (GCI) under weak grid. Impedance analysis shows that the frequency interaction point outside the capacitive negative damping region can effectively avoid the oscillation.

What is a grid connected inverter?

1. Introduction The grid-connected inverter is the vital interface module for distributed generation (DG) systems, including wind power generation, photovoltaic power generation, to be connected to the grid. It can directly determine the value and direction of current and power and is crucial for the safe operation of the grid [1, 2].

What if a grid-connected inverter is unbalanced?

Author to whom correspondence should be addressed. Under unbalanced grid voltage faults, the output power oscillation of a grid-connected inverter is an urgent problem to be solved. In the traditional topology of inverters, it is impossible to eliminate power oscillation and simultaneously maintain balanced output current waveform.

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