

# Small grid-connected inverter





## Overview

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What is a grid-connected inverter system?

The typical structure of a grid-connected inverter system is depicted in Fig. 1, consisting of the main circuit and the controller. The AC grid is represented by a constant voltage source connected in series with a resistive-inductive load. The converter adopts voltage-oriented control.

Do grid-connected inverters have a small-signal stability region?

Therefore, it is essential to construct a small-signal stability region (SSSR) for the grid-connected inverter to analyze system stability comprehensively. Presently, the investigation of the SSSR for grid-connected inverters primarily relies on the state-space method.

What control approaches are used in grid-connected inverters?

The commonly used control approaches in grid-connected inverters are the grid-following (GFL) and the grid-forming (GFM), whose operation modes are dual seeing by the grid. The GFL determines the output current angle reference of the inverter based on the angle estimation by a synchronism loop at the point of connection voltage.

How stable is a grid-connected inverter system?

According to Fig. 3, it can be recognized that the grid-connected inverter system demonstrates small-signal stability for the operating conditions situated behind the red border. Moreover, the corresponding maximum real part is significantly negative, indicating that the system has a large stability margin.



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