

Wind power generation variable speed constant frequency system





Overview

Why do variable speed wind turbines need regulation?

With an increasing wind power penetration in power systems, there is an increasing need for regulation from variable speed wind turbines (VSWTs) to provide support in order to reduce frequency instabilities in the power system. This need is due to the lack of an inertia response of the VSWT in their basic configuration .

Do variable speed wind turbines affect power system frequency control?

This study presents the impact on power system frequency control in small power systems based on different generator topologies with a large penetration (50%) of variable speed wind turbines. The impact of a proposed controller is investigated versus various wind speeds.

Does wind-speed variability affect frequency control?

Fairly high inertia and rapid governors produce a fast frequency control (though oscillating due to features of the power system). Furthermore, two different wind speeds were considered, but there is no discussion of the impact of wind-speed variability on the frequency of the power system.

What is a variable speed wind energy conversion system (WECS)?

A variable speed Wind Energy Conversion System (WECS) contains a wind turbine that drives a permanent magnet synchronous generator (PMSG). The wind turbine and the PMSG are connected to a DC bus voltage through an AC/DC converter.

What is a variable speed wind turbine (VS WT)?

Out of the three types of wind turbines (WT), the variable speed wind turbine (VS WT) is more advantageous. It can improve power quality, reduce mechanical stress created by wind fluctuations, and attain maximum power point tracking (MPPT) to squeeze high power out at various wind rates.



Which synchronous generator produces the worst frequency variations?

Various wind speed and three different types of synchronous generators are evaluated. Wind speeds with an average value slightly under the rated wind speed of the turbine show to produce the worst frequency variations.



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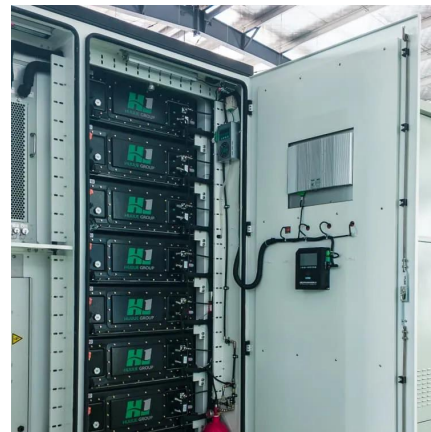


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Abstract--Wind turbine generators (WTG) can participate in system frequency regulation via virtual inertial controllers (VIC). In the presence of frequency disturbances, VIC temporarily reg ...

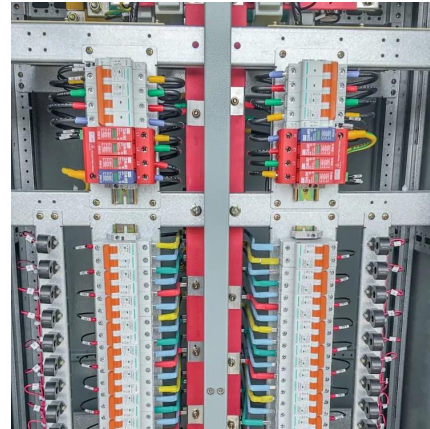


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