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Lecture

Power-system stability improvements with wind-power generators

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The forthcoming EU 2030 energy strategy will continue to increase the number and size of wind-energy conversion systems. However, due to the stochastic nature of wind and reduced inertia, the power-system stability might be adversely affected. Therefore, the grid codes for wind-power integration introduce new performance requirements on low- and high-voltage ride-through capability, reactive-power voltage support and the frequency inertial response. The research on wind-energy conversion systems is, therefore, not only about maximizing the generated active power; it is also related to control schemes for improving the overall power-system stability.

In MW-sized wind-energy conversion systems, synchronous generators (SGs) and doubly fed induction generators (DFIGs) are typically used. The power of the converters used in DFIG-based applications is usually 30 % of the rated power of the wind turbine. The decoupling from the grid is only partial, while the DFIG stator modes are weakly damped with a natural frequency near the grid frequency. The SG-based applications, on the other hand, use full-size frequency converters that ensure complete decoupling from the grid.

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