

# Releasable Kinetic Energy-Based Inertial Control of a DFIG Wind Power Plant - DTU Orbit (08/11/2017)

## Releasable Kinetic Energy-Based Inertial Control of a DFIG Wind Power Plant

Wind turbine generators (WTGs) in a wind power plant (WPP) contain different levels of releasable kinetic energy (KE) because of the wake effects. This paper proposes a releasable KE-based inertial control scheme for a doubly fed induction generator (DFIG) WPP that differentiates the contributions of the WTGs depending on their stored KE. The proposed KE-based gain scheme aims to make use of the releasable KE in a WPP to raise the frequency nadir. To achieve this, two additional loops for the inertial control are implemented in each DFIG controller: the rate of change of frequency and droop loops. The proposed scheme adjusts the two loop gains in a DFIG controller depending on its rotor speed so that a DFIG operating at a higher rotor speed releases more KE. The performance of the proposed scheme was investigated under various wind conditions. The results clearly indicate that the proposed scheme successfully improves the frequency nadir more than the conventional same gain scheme by releasing more KE stored in a WPP, and it helps all WTGs to ensure stable operation during inertial control by avoiding the rotor speed reaching the minimum speed limit.

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