

Stability Margin of DFIG wind turbines: effects and solutions

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Abstract

Doubly Fed Induction Generator (DFIG) based wind farms are one of the major contributors to wind power generation. Even though they possess advantages such as the capability of generating active power over an extended range of speed and the reduction of mechanical stresses in the turbine and the coupling, achieving maximum power extraction at high wind speeds while satisfying the present grid code requirements is a major issue. This is because the stability of the DFIG imposes a limitation on extracting maximum power at super synchronous speeds.

An operating chart of the DFIG has been derived incorporating a steady state stability margin for safe operation. The PI limits of the active (P) and reactive (Q) power controllers have been derived by considering stator current, the rotor side converter power ratings and the stability margin of the generator. Studies also have been carried out to investigate what factors could be considered to improve the P and Q capability of the DFIG wind turbine.