Siemens Wind Power variable-speed full scale frequency converter wind turbine model for balanced and unbalanced short-circuit faults

Transmission system operators and wind power plant developers must conduct power system stability analyses. Through such analyses they evaluate the fault-ride-through capability, control and grid-impact from wind power plants when the power system is subject to balanced, e.g. symmetrical three-phase, as well as unbalanced, e.g. asymmetrical two-phase-ground, phase-phase and single-phase-ground, short-circuit faults. Since the analyses are carried out utilizing large power system models, the representations of networks, generation units of different types and origins and consumption centers apply a common approach of the dynamic RMS, e.g. root-mean-square, network modeling. Siemens Wind Power has developed a dynamic model of variable-speed wind turbines utilizing full scale frequency converters to be used for investigations of balanced and unbalanced short-circuit faults. The model is implemented in the commercially available simulation program DIgSILENT PowerFactory, which is commonly used by the system operators and developers for such power system analyses, and successfully validated with certified fault-ride-through tests.