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A Novel Control Scheme for Wind Turbine Driven DFIG Interfaced to Utility Grid

In this project, a novel control strategy of Phase-Locked Loop (PLL) is proposed for wind turbine driven doubly fed induction generator interfaced to utility grid with a Battery Energy Storage (BES) connected at the dc link. The control of Grid-Side Converter (GSC) is modified to export/import constant power to/from the grid. The state of charge of BES helps in deciding the reference export power to the grid apart from the manual selection using averaged wind power in a particular period of time. Maximum power point tracking logic is incorporated in the Rotor-Side Converter (RSC) control to operate the BES within its constraints and, moreover, to feed constant power to the grid. In addition, the energy management scheme of the system is presented in the form of flowchart for both exporting and importing power to/from the grid. The RSC and GSC have taken care of unity power factor operation at stator terminals and to mitigate harmonics and grid currents balancing, respectively. The system performance is found robust as the PLL response is not affected even under grid voltages with dc offset. The system is modeled and simulations are carried out in MATLAB using Sim Power Systems tool box. Moreover, the control scheme performance is compared with conventional control algorithms both in terms of PLL and converter controls.

Domain: Power Systems _ Wind Power Generation

Technology: Electrical