

CONSTANT GRID POWER CONTROL OF WIND TURBINES WITH DFIG AND LONG DURATION STORAGE UNIT

Armand Boyette¹, Philippe Poure², Shahrokh Saadate¹

*¹Groupe de Recherches en Electrotechnique et Electronique de Nancy, GREEN-UHP,
CNRS UMR 7037*

*²Laboratoire d'Instrumentation Electronique de Nancy, LIEN, EA 3440
Université Henri Poincaré de Nancy I, BP 239, 54506 Vandoeuvre les Nancy cedex France
E-Mail: Armand.Boyette@green.uhp-nancy.fr,
philippe.poure@lien.uhp-nancy.fr, Shahrokh.Saadate@green.uhp-nancy.fr*

Keywords: Constant power generation; doubly fed induction generator (DFIG);
wind energy conversion system; electrical energy storage

ABSTRACT

This paper deals with the design, analysis and simulation of a constant grid power wind energy conversion system based on electrical energy storage and indirectly controlled doubly fed induction generator (DFIG). This horizontal axis wind turbine system generates a constant active power through the grid under all wind conditions. The incorporation of a battery or other energy storage device in the DC link enables temporary electrical energy storage. The modelling of the mechanical part of the turbine is particularly detailed. Then modelling and indirect control of the DFIG are presented. Independent control of active and reactive powers is achieved and the storage unit rating for this operation is performed. The control of this unit is also discussed. Simulation results validate the study for two experimental long duration wind speed profiles.