GPS Synchronization and EMC of Harmonic and Transient Measurement Equipment in Offshore Wind Farms

The challenges of harmonic and transient measurements in wind farms are described in this paper. It is shown that appropriate measurements of harmonic and transient phenomena in offshore wind farms are essential for data analysis and model creation/validation of components or subsystems. The GPS synchronization, electromagnetic compatibility (EMC) and interference (EMI) challenges during the development, construction, testing and installation of a measurement system for multi-point, high-speed and long-term data logging is described in this paper. The presented measurement system was tested in a rough offshore environment at Avedøre Holme and Gunfleet Sands offshore wind farms. The paper will describe the application of GPS technology in synchronised measurements carried out at Avedøre Holme and Gunfleet Sands wind farms. Different aspects of software development and hardware configuration in order to optimise measurement systems reliability during offshore measurements will be presented. Also real-life examples of results from both offshore measurement campaigns will be described. Some limitations, improvements and results of the measurement system will be explained from both harmonic and transient measurements. The paper clearly presents possible electromagnetic interference in wind turbines that can affect measurements. Also the application of appropriate mitigation techniques such as data acquisition board configuration, coaxial cable leading, as well as usage of EMC-proof boxes for high frequency measurements is described.

General information
Publication status: Published
Organisations: Department of Electrical Engineering, Center for Electric Power and Energy, Ørsted A/S, Aalborg
University
Pages: 212-228
Publication date: 2012
Peer-reviewed: Yes

Publication information
Journal: Energy Procedia
Volume: 24
ISSN (Print): 1876-6102
Ratings:
Scopus rating (2012): CiteScore 1.08 SJR 0.411 SNIP 0.56
ISI indexed (2012): ISI indexed no
Web of Science (2012): Indexed yes
Original language: English
Keywords: GPS synchronization, EMC, EMI, harmonic measurements, offshore wind farm, transient measurements
Electronic versions:
http_dtu_ftc.cvt.dk_cgibin_fulltextelsevier_pi_1876_6102_0024000c_12011435.pdf_key_367811942_rfr_id_info_sid_dlib.dtu.pdf
DOIs: 10.1016/j.egypro.2012.06.103
Source: dtu
Source ID: n:oai:DTIC-ART:elsevier/367811942::27098
Research output: Contribution to journal › Conference article – Annual report year: 2012 › Research › peer-review