



AIUB DSpace Publication Details

Title: Hybrid Power System Frequency Control including Wind Farm using Battery Storage System

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Published Journal Name: AIUB Journal of Science and Engineering (AJSE)

Type of Publication: Journal

Volume: 19 Issue 1

Publisher: American International University-Bangladesh (AIUB)

Publication Date: April 29, 2020

ISSN: 1608 – 3679

DOI: <https://doi.org/10.53799/ajse.v19i1.56>

URL: <https://ajse.aiub.edu/index.php/ajse/article/view/56>

Other Related Info.: Pages 41-46



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Abstract:

Fixed speed wind turbine-squirrel cage induction generator (FSWT-SCIG) based wind farm (WF) is increasing significantly. However, FSWT-SCIG have no frequency control capability, which creates a significant problem on power system steady-state stability. This paper represents a new operational strategy to control frequency of the entire power system including large-scale FSWT-SCIG based WF by using battery storage system (BSS). The proposed cascaded control of BSS is designed to provide effective amount of real power during steady-state period to damp frequency fluctuations. To evaluate the validity of the proposed system, simulation studies are executed on a reformed IEEE nine-bus power system with three synchronous generators (SGs) and SCIG-based WF along with BSS. The simulation results indicate that the proposed system can be an effective solution to reduce frequency fluctuations of the hybrid power system during steady-state condition.

Keywords: FSWT-SCIG, Battery Storage System, Power System Stability, Synchronous Generator.