A comparative analysis for stability improvement of BESS connected with diesel generator

Jongmin Jo¹ and Hanju Cha¹

¹Department of Electrical Engineering, Chungnam National University, Daejeon 34134, Korea

Accepted for publication on 14th June 2016

In this paper, stability of current control of battery energy storage system (BESS) connected with a diesel generator for a stand-alone microgrid are analyzed in three cases. The stand-alone microgrid system consists of 50kW BESS, 50kW diesel generator and controllable loads, where BESS is composed of 115kWh battery bank and 50kW DC-AC inverter. The three cases are 1) BESS with a stiff grid 2) BESS with the diesel generator 2) BESS with damping + diesel generator, and their stabilities are analyzed by using a root locus in the discrete time z-domain. Demonstration site for the stand-alone microgrid is constructed and comparative analysis for three cases are verified through experiments, where experimental results show a good agreement with the analysis and current control is stabilized with 2.2% of THD.

Keywords: stability, battery energy storage system, diesel generator, stand-alone microgrid