



I-PD CONTROL DESIGN AND ANALYSIS IN AN ISLANDED MICROGRID SYSTEM

S. D. Panjaitan¹, R. Kurnianto², B.W. Sanjaya³, M. C. Turner^{4#}

Department of Electrical Engineering, Tanjungpura University, Pontianak 78124, Indonesia

[#] Department of Engineering, University of Leicester, Leicester LE2 1AH, United Kingdom

Emails: seno.panjaitan@ee.untan.ac.id¹, rudi.kurnianto@ee.untan.ac.id²,
bomo.wibowo@ee.untan.ac.id³, mct6@leicester.ac.uk⁴

Submitted: Aug. 5, 2017

Accepted: Nov. 12, 2017

Published: Dec. 1, 2017

Abstract- Voltage and frequency control is very important especially to face the migration from conventional to smart grid. In conventional way, voltage and frequency are regulated from the main power plant. However, in a smart grid system, the controller can be distributed into sub-system. A microgrid as a key sub-system must have independent control especially in islanded or stand-alone mode. This paper presents an approach named Integral-Proportional Derivative (I-PD) to control the three-phase voltage in a microgrid. In the simulation using MATLAB, a distributed energy resource unit applying voltage-source converter in order to have three-phase voltage from a DC-source is taken into account. Using system identification to simplify the controller design generates a linear model of the system. The compensated system shows a very good reference tracking capability during set point and load changes. It also reduces the coupling effect due to active and reactive power.

Index terms: smart grid, microgrid, voltage control, distributed generator, energy control.