

ABSTRACT

Idam Firdaus, Bachelor Degree Majoring in Physics Engineering, Faculty of Engineering, Telkom University, February 2014, Analysis Of Temperature Control Influence On The Proton Exchange Membrane Fuel Cell (PEMFC) Using PID Controller, Guidance Lecturer: Mukhammad Ramdhan Kirom, M.Si. as Guidance Lecturer I and Reza Fauzi Iskandar, M.T. as Guidance Lecturer II.

Fuel Cell Power Generation is a renewable energy system that by the principle of electrochemical reaction produces electrical direct current (DC) as well as heat and water as the rest of the reaction. The excess heat is generated from the Fuel Cell can degrade the performance of Fuel Cell. Therefore, a temperature control system to maintain the temperature of the Fuel Cell stacks was needed, so it could be in the ideal working temperature. The temperature control system was done in PEMFC 100W using PID control with root locus method, and gained a proportional gain $K_p = 3.65$ and proportional integrative gain $K_i = 0.365$. The considerations of the selection of this gain were based on transient response system, which are a fast rise time, an overshoot as small as possible, and no steady state error. When the gain was implemented into the system, the system had a rise time of 0.2 seconds, had no overshoot, and the steady state error value was at 0.08°C . The temperature control system was able to generate optimal PEMFC 100W performance which was ± 16 volts, and was able to maintain the optimal temperature of the PEMFC 100W which was $\pm 31^\circ\text{C}$.

Keywords: PEMFC, temperature control system, PID, root locus, transient response system.