ABSTRACT

Cubesat is a small satellite with the standard size that called cubesat 1U. Cubesat 1U dimension is 10 cm × 10 cm × 10 cm with maximal weight is 1,33 kg. This satellite oribts at Low Earth Orbit (LEO) which has a height of 200-3000 km above the surface of earth. Attitude Determination and Control System (ADCS) is a one of sub-system of satellite that functions to control satellite attitudes. Attitude control aims to maintain the orientation of satellite angle to keep the orientation to the object that has been determined. In order to control satellite attitudes can work well than a reaction wheel needed as an actuator and sensor MEMS as a feedback of the system. In this final project made the prototype of cubesat 1U that has dimension 10 cm × 10 cm × 10 cm.

In the design and implementation of the satellite attitude control system at in this final project using a close loop scheme with PID control method on air bearing as a test tool. The sesor used is MPU 6050 which has an integrated MEMS gyroscope and MEMS accelerometer. The MPU 6050 sensor has a lot of noise on the out put signal, then Kalman Filer and Moving Average is used as method to eliminate noise of the sensor. From the result of testing the MPU 6050, Kalman Filter has smaller standard deviation value than Complementary Filter, the value is 0.023 for roll axis and 0.031 for pitch axis. Moving Average method is able to reduce noise on the sensor readings with an error value on the roll axis is 0, pitch axis is 0.23, and yaw axis is 1.14. Based on the realization of the satellite control system using MEMS, the comparison of the system using PID method with value of $Kp = 8$, $Ki = 1$, and $Kd = 1$ between the response to the system realization and simulation on Matlab has an error value of 0.22 for the roll axis, pitch axis of 0.20, and the yaw axis is 0.24.

Key Words: Cubesat, *Attitude Determine Control System, Reaction wheel,* Sensor MEMS