ABSTRACT

Nanosatellites have mass of 1-10 kg and orbiting at LEO (Low Earth Orbit) with height of 600-1000km above the earth's surface. In nano satellites, there is a system named Attitude Control Active which can control the attitude of satellites when orbiting in space [3]. One of the actuators from the Attitude Control Active system is magnetorquer. Magnetorquer is the main active control of nano satellites, because this actuator are more effective than other actuators, since the magnetorquer relies on interactions between the earth's magnetic field and magnetic dipole moments produced by magnetorquer.

Magnetorquer have several models, including circular coil in the form of wire winding on a core with flowing current, square coil in the form of wire winding without core with flowing current too, and rectangular microstrip in the form of rectangular spiral patch which with flowing current too. In this final project the writer analyzes the effectiveness of the three magnetorquer models which refer to the simulation results, namely the magnetic field and magnetic induction values which will produce magnetic dipole moments, the current used, the torque produced, and its dimensions.

Models of magnetorquer designed are required to reach the target torque on the nano satellite that is designed which is 0.01745 Nm. The circular coil model (7×90) mm^3 produces a magnetic dipole moment 0,1551 Am^2 and a torque of 0.03489Nm, the square coil model $(70 \times 70 \times 3)$ mm^3 produces a magnetic dipole moment of 0,1256 Am^2 dan torque of 0,02826 Nm, while the rectangular microstrip model $(90 \times 90 \times 1,7)$ mm^3 produces a magnetic dipole moment of 0,0759 Am^2 and a torque of 0,01707 Nm. Based on considerations of limited current and dimensions of nano satellites, the square coil model is more suitable to be applied, because it has a high enough torque so that it can use smaller input currents and smaller dimensions.

Keywords: nanosatellite, ADCS, active control, circular coil, square coil, rectangular microstrip