

Magnetic Field Analysis for Development of Magnetic Torquer

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There are many actuators and sensors used for attitude control system for KOMPSAT such as Reaction Wheel Assembly, Magnetic Torque Assembly, Dual Thruster Module, Solar array Drive, Three Axis Magnetometer, Conical Earth Sensor, Fine Sun Sensor Assembly, Coarse Sun Sensor Assembly, Gyro Reference Assembly and so on. For KOMPSAT satellite it has been considered using the Magnetic Torquer (MTQ) generating the magnetic dipole moment. In general, the magnetic dipole moment for satellite attitude control system is used for dumping out the excessive reaction wheel momentum so that the reaction wheel speed is not saturated. The objective of this study is to analyze the magnetic field characteristics generated by the Magnetic Torquer using the Maxwell 2D Field Simulator software. Currently, the developing model (DM) of the MTQ is being developed and manufactured at a company under the supervision of KARI. MTQ is an electromagnet consisting of a ferromagnetic cylindrical core on which an excitation coil is wound. A current is passed through the coil to produce a dipole momentum in the ferromagnetic core. The configuration of the MTQ will be introduced in the presentation. The 2 dimensional model of the MTQ is drawn as axisymmetric models in RZ plane, and each corresponding material is assigned to the each MTQ object, the core, coil, and background. After the boundary conditions, current sources, and solution parameters are set up, the magnetic field intensities, directions, and other values specified by users can be calculated by using the finite element analysis. The theoretical magnetic field quantities obtained by the Maxwell 2D Simulator can be used for the basis of the development of the MTQ.