MAGNETORQUERING ALGORITHM FOR LEO SATELLITE ATTITUDE CONTROL

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Magnetorquering algorithms for LEO satellite attitude control are presented. The hardware and control algorithm of the on-off style torquer for the KITSAT-1 and 2 are briefly reviewed. Since the precision attitude control of KITSAT-3 requires to develop more sophisticated control actuators, advanced hardware design of 3-axis magnetorquer with continuous magnitude control capability is introduced. Redundancy design concept and reliability problems are also mentioned as a space use equipment. Interactions of satellite and space environments including the geomagnetic field have been modeled and analyzed. Considering the attitude and orbit dynamics of the satellite, in-orbit operation scenario of KITSAT-3 has been characterized. The attitude control scheme of 3-axis reaction wheels with magnetorquers is evaluated by simulation to demonstrate the momentum unloading characteristics. Finally, critical issues such as power consumption and residual magnetic dipole problems are also discussed for space applications.