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GIMBALED PERMANENT MAGNET-BASED ATTITUDE CONTROL FOR
PICO/NANO-SATELLITES**Abstract**

As man-made satellites grow continually smaller and smaller, new, lower mass, volume, and power solutions must be devised to give these satellites the same performance capabilities as larger satellites. One subsystem that is especially difficult to shrink is the Attitude Determination and Control System (ADACS), which is used to position the satellite in a given orientation with respect to a specific reference frame. This paper explores a novel mechanism which combines both of these functions into one device. A permanent magnet is used in conjunction with the geomagnetic reference frame to provide magnetic torque to change the spacecraft's attitude. By gimbaling the magnet, any desired attitude may be achieved. Experiments run in a simulated environment (air table) have been used to test the effectiveness of this technique and the results are used to provide the design parameters for a space qualified system for CubeSats.