MAGION SMALL SPACECRAFT AS A TOOL FOR FLIGHT DYNAMICS LEARNING

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MAGION is a small (60 kg mass) spacecraft (s/c) developed by the Institute of Atmospheric Physics of the Czech Academy of Sciences. The s/c was launched as a subsatellite of a main PROGNOZ s/c on August 3rd, 1995 in a framework of INTERBALL mission.

Magion is spin stabilized and equipped by cold gas engine unit which allows to keep the necessary attitude of s/c and to fulfill small orbital maneuvers in order to sustain the necessary relative position with respect to the main s/c.

The paper describes the main points of the possibilities for student flight dynamics learning which could be delivered by available data files collected from MAGION telemetry. The direct access for motion control of this particular s/c as for the s/c of this type is also proposed in the framework of the training program.

Several areas of mechanics are available to be learned: solid body attitude free motion, influence of the damping forces on the motion, optimal control of the attitude motion, motion of the spacecraft under light pressure influence, orbit determination and control with the use of different types of measurements, orbital maneuvers, optical and magnetic field data processing for attitude determination of the s/c.

Some of the possible students works with the life s/c include the scientific studies such as interactions of the photons with s/c surfaces and exploration of the fluid dampers influence on the s/c attitude motion. Different approaches would be tested for motion models. A broad spectrum of problems are proposed which are generated by necessity of actual parameters of spacecraft systems estimation.