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ATTITUDE DETERMINATION AND CONTROL SYSTEM DESIGN FOR A MODULAR SMALL
SATELLITE PLATFORM FOR EARTH OBSERVATION

Abstract

In the framework of the Space Systems and Business Engineering programme at Graz University of Technology, Austria, a small Earth Observation satellite for pipeline leak detection has to be defined. This paper will look into the particular systems engineering and design process aspects of the Attitude Determination and Control (sub)system (ADCS) of the flight segment. As starting point of this process serves the definition of mission control modes and specific ADCS (sub)system-level requirements related to pipeline leak detection which will be addressed in detail. Traceability is established between high-level payload/mission requirements and other subsystem impacts on the ADCS design and requirements baseline. This includes respective trade-off scenarios including specific problems encountered leading to the final design choice. In the frame of this process additional emphasis is given to the spacecraft stabilizing and control method selection, to the control loop layout covering actuators and sensors definition and to the attitude disturbance torques description. The proposed concept of modularity of this satellite platform is also addressed and the prospects of minimizing the redesign effort to reconfigure the ADCS subsystem to variable mission requirements are discussed.