IMPACTS OF ONBOARD NAVIGATION SYSTEM ON BIRD ATTITUDE CONTROL SYSTEM

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ABSTRACT

BIRD is a small satellite for Earth observation. It will be launched in summer 2001. The altitude is approximately 600 km.

The paper will show, how the introduction of on-board navigation influence and changed the attitude control system design.

From the payload side “only” a precise on-board geocoding of image data was required. Therefore it became necessary to have an accurate on-board navigation system (ONS). The ONS is based on a GPS receiver and estimates the actual spacecraft position and velocity in WGS 84 frame.

The receiver is used to get the UTC time on board automatically. This is used for time tagged telecommands and for time stamps on board.

Once it was decided to have the ONS, it influenced the attitude control system design. ONS produces the inertial orientation of the local level, local vertical frame (LHLV) at present position. From that the actual nadir direction in inertial frame can be derived and the required information for any target pointing on Earth is available.

Related to the recursive and discrete in-time BIRD ACS it was necessary, that ONS predicts the information synchronized with ACS control cycle.