ACCURACY STUDY OF THE UPPER ATMOSPHERE RESEARCH SATELLITE (UARS) DEFINITIVE ATTITUDE DETERMINATION

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ABSTRACT

The Upper Atmosphere Research Satellite (UARS) has two definitive attitude determination requirements: the definitive attitude of the Modular Attitude Control Subsystem (MACS) and the definitive attitude of the gimbaled Solar-Stellar Pointing Platform (SSPP). The onboard computer (OBC) will compute the MACS attitude using a Kalman filter and will transform this attitude solution through the SSPP gimbals to calculate the SSPP attitude. The attitude ground support system (AGSS) will compute the MACS attitude using a batch least-squares differential corrector algorithm and will also transform this solution through the gimbals to obtain the SSPP attitude. This paper reports the results of a prelaunch study to predict the accuracy of the OBC attitude solutions and the accuracy of the AGSS attitude solutions. The OBC and AGSS solution accuracies are then compared to establish the relative quality. The effects of star observability, sensor noise, and sensor misalignment uncertainties on attitude determination accuracy are analyzed for each case.