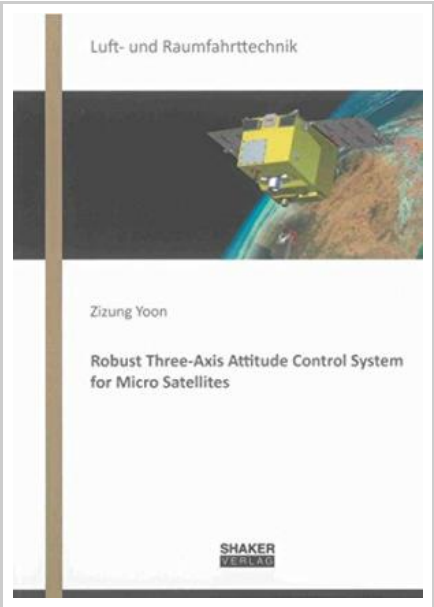

Robust Three-Axis Attitude Control System for Micro Satellites

By Zizung Yoon

Shaker Verlag Jun 2011, 2011. Buch. Condition: Neu. Neuware - Technical advances in microelectronics and micromechanics signalled the start of an era for small satellites in the late 1980's. Particularly in the last decade small satellites have proven their potential not only in missions with scientific and educational objectives, but also for those with cost-effective commercial and governmental purposes. Fault tolerance and reliability still remain however, a key issue for technical and economical advancement in small satellite design. This thesis therefore proposes a concept for a fault tolerant and robust attitude determination and control system adapted to micro satellites. After an investigation of modern fault handling approaches, a model based fault detection approach with hardware redundancy was chosen. This approach is particularly applicable for the use in small satellites, as the fault detection is realized not necessarily by additional hardware but by software algorithms. A hierarchical fault handling concept, a model based fault detection algorithm, and a novel time-optimal state control algorithm are all proposed. These algorithms were verified in a simulation and implemented in the three-axis attitude control system of the small satellite TET-1. Finally the concept was successfully verified in a hardware-in-the-loop test bed. The hierarchical fault handling...

Reviews

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