Robust Controller Design for Drag-Free Satellites

By Lorenzo Pettazzi

Shaker Verlag Jun 2009, 2009. Buch. Book Condition: Neu. 21x14.8x cm. Neuware - The drag-free satellite concept has been considered in the past for scientific missions where it is necessary to put a test mass into an ultra-quiet free-fall condition. This requires the design of a drag-free controller able to reduce the non-gravitational accelerations acting on the test mass to extremely low values. The design of such controller relies on the model of the system available. It is usually very expensive and sometimes even impossible to model the satellite dynamic to an accuracy level comparable to the one associated to the free-fall requirement. For this reason, the control system must be robust against the uncertainties present in the model. The issue of robustness of drag-free controllers is investigated in this work under two different points of view, namely analysis of robustness and synthesis of robust controllers. First the robustness of performance of a controller implemented on a real mission is investigated. The result of the analysis shows that robustness of performance must be properly taken into account during the design of a drag-free satellite in order to decrease the costs associated to the mission development and not to compromise the...

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