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SPECIAL ASPECTS OF THE ISS FLIGHT CONTROL DURING ITS 15 YEAR FUNCTIONING

Abstract

International Space Station is the most notable space project designed from the first satellite in the 1957 year. The first ISS's module was launched in 1998. During the all period of ISS existence more than 140 transport vehicle visited the station. To the beginning of the 2014 year the ISS mass was more than 409 ton and the average altitude of its orbit was 416 km. About 33 ton of fuel was spent to support the ISS orbit during the selected period and 216 maneuvers were done. The ISS functioning is planned at least until 2025 year and Russian segment development is expected. The ISS flight control is connected not only with orbit altitude maintenance because of the atmosphere drag influence. Also it's connected with the ensuring of special ballistic conditions required for the space flight program implementation. These conditions are constraints of the orbit average altitude maximum required for the large and heavy modules delivery, special ISS orbit position requirements for the transport vehicle launch and for the crew landing, ensuring of the special date range for the everyday space shuttle launch possibility (in past), ensuring of the ISS flight safety and etc. Fulfillment of these conditions is guaranteed by the special orbit forming maneuvers implementation. The maneuvers parameters (insertion time and V magnitude) are calculated by MCC ballistics taking into account different perturbations like atmosphere drag uncertainty, debris avoid maneuvers necessity, flight program correction and etc. This report is dedicated to the special aspects of the ballistic and navigational support of the ISS space flight control during the period of its existence from 1998. The report presents technical approaches used for ballistic schemes designing. These approaches are based on the repetitive orbits utilization and calculation of the orbit maneuvers parameters for the long time period in the condition of different uncertainties.