

IAF ASTRODYNAMICS SYMPOSIUM (C1)
Attitude Dynamics (2) (9)

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PROBLEMS OF DEVELOPMENT OF AN EXPERIMENTAL PLATFORM “THE ANGULAR
ORIENTATION AND STABILIZATION STAND”

Abstract

The Angular Orientation and Stabilization Stand is a platform intended for development of an algorithm for attitude control of a satellite in space. The stand operates on the principle of creating air bearings in all movable parts of the stand. This requires solving certain problems. 1. The quality of the surfaces between which the air cushion is created must be very high, the surfaces must be as smooth as possible down to the submicron level. 2. The Earth’s magnetic field in situations with different satellite positions in orbit has to be simulated. 3. Air removal systems for the air bearings are needed to prevent appearance of turbulence in the air cushion space. This brings in the following problem: such air ducts create perturbations affecting the suspended equipment. And in such devices, even tiny perturbations affect operation of the stand. All these problems are solved in the following way: 1. Ultra-quality surface preparation from non-corrosive materials with possible application of anodizing coating with low roughness; 2. High air quality: no particles of dust, oil, etc. should be present in the air; 3. Mounting of deflectors of the exhaust air from an air bearing. 4. Mounting of a magnetic field simulator for working out the algorithms of satellite control in the whole range of the operational orbit. If these conditions are met, we can say that this installation will qualitatively create conditions close to zero gravity, which will enable development of a high-quality algorithm for controlling the satellite in outer space. Such installations are needed for development of fully autonomous control systems, which will be able to operate for a long time without human intervention, for any spacecraft.