

ASTRODYNAMICS SYMPOSIUM (C1)

Attitude Dynamics (2) (9)

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A FLUID-DYNAMIC ATTITUDE CONTROL SYSTEM FOR TECHNOSAT

Abstract

The Fluid-Dynamic Actuator (FDA) is a novel attitude control actuator for small satellites. The system consists of a closed ring structure containing liquid metal, an electromagnetic pump and the respective control electronics. A bi-directional DC- conduction pump uses the Lorentz body force to accelerate the liquid metal in the ring and hence to store angular momentum. For the verification within the TechnoSat mission a eutectic alloy of Gallium, Indium and Tin is used as liquid metal. Due to its simple design, which does not include any moving parts, the FDA offers strong shock resistance and low abrasion. On board the technology testing platform TechnoSat, a fluid-dynamic actuator is to be tested for the first time in orbit. At Technische Universität Berlin, the theoretical foundations as well as a functional flight model have been developed. This paper covers the structural, thermal and mechanical test campaigns as well as the attitude control performance of the ground-qualified sixth version of a fluid-dynamic actuator.