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# A THREE-AXIS FLUID-DYNAMIC ATTITUDE CONTROL EXPERIMENT FOR SALSAT

**Abstract**

The Fluid-Dynamic Actuator (FDA) is a novel attitude control actuator for small satellites. The FDA is based on magneto-hydrodynamics. It consists of a closed ring structure containing liquid metal, an electromagnetic pump, and respective control electronics. The core component is a bidirectional acting DC conduction pump which accelerates the liquid metal in the ring to build up an angular momentum. Due to its specific design, which does not involve any mechanical moving parts, the FDA offers strong shock and high wear resistances. The novel concept of the FDA has been developed within research projects at Technische Universität Berlin. A first functional flight model was realized and has been integrated into the TechnoSat nanosatellite mission. The mission was successfully launched in July 2017, whereby the single axis FDA is controlling the z-axis of the satellite and it is still operating since its commissioning in September 2017. In the subsequent step, a complete 3-axis attitude control system will be realized and verified in the scope of the SALSAT mission. This paper covers a general description as well as the attitude control performance of the FDA system. Furthermore, a concise description of the SALSAT mission will be presented.