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Author: Mr. Frank Baumann
Technische Universität Berlin, Germany

Mr. Nikolas Korn
Technische Universität Berlin, Germany

Mr. Kjell Pirschel
Technische Universität Berlin, Germany

Mr. Ronny Wolf
Technische Universität Berlin, Germany

Prof. Klaus Brieff
Technische Universität Berlin, Germany

A PICOSATELLITE SWARM FOR TECHNOLOGY DEMONSTRATION

Abstract

Distributed satellite systems like mega-constellations or swarms enable novel applications, but they are only economical when using highly miniaturized but still high-capacity spacecrafts. Miniaturization is achieved by multifunction component assembly, the utilization of commercial off-the-shelf parts as well as the implementation of power supply and communication buses.

Essential functions of a distributed system are the communication and the relative navigation among the satellites. At TU Berlin a picosatellite swarm mission was developed consisting of the four quarter-unit CubeSats BEESAT-5 to -8 with a mass of 330 grams each. The picosatellites were designed fully redundant and almost complete single-fault tolerant. The primary mission objective is to demonstrate a newly developed communications subsystem in the UHF band and an experimental GNSS receiver. Furthermore, the satellites contain a multifunction optical attitude determination sensor and are equipped with corner cube reflectors on all sides for laser ranging from ground. The satellites will be launched at the end of 2017, beginning of 2018 into a sun-synchronous orbit.

The flight results and the verified components will be used for future nanosatellite formation and swarm missions of TU Berlin. The presentation gives an insight to the satellite design.