

SYSTEM DESIGN OF SPACE VEHICLE FOR SMALL SIZE ORBITAL DEBRIS OBSERVATION

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Abstract

World astronautics has made more than 4000 space launches for the last 45 years, and has generated approximately 13 000 trackable objects in near-Earth space orbits. Only some six to seven hundreds of these are operational spacecrafts; the remainder constitute is space debris, and many are traveling fast enough to seriously damage or destroy anything they hit. The space debris problem is significant and has to be solved. There are also approximately 150 000 small objects, which are not trackable easily.

Solution for this problem can be an observation of space debris directly from the orbit, using space-based radar. Small debris objects are typically defined as objects smaller than 10 cm in size. Such objects are not capable of being tracked from Earth, and therefore represent a considerable danger for the space operations.

In this work, preliminary system design of a spacecraft is carried out. The spacecraft can be based on its own platform or exiting platforms can also be made suitable. The following subsystems are included into the system, besides payload: mechanical structure, thermal subsystem, communication subsystem, altitude and dynamic control subsystem, propulsion subsystem, energy subsystem, scientific instrument subsystem. And, *active radar subsystem* as a payload.

Above represented method is the possibility to track approximately 10 to 25% of existing small debris population on LEO.