

MODELLING OF NANOSATELLITES IN FORMATION FLYING

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Abstract: The miniaturization and increasing efficiency of spacecraft components and payloads resulted in ability of small satellites (mass less than 500 kg) to perform complex missions previously reserved for larger units. Additionally, relatively low cost and development time increased interest in nanosatellites, especially in CubeSat standard. The low mass and low energy consumption of payloads suitable for nanosatellites allow to perform complex tasks and provide high quality data. Nanosatellites are considered now not only as an educational and technology research tool but also as low-cost platforms for scientific and commercial applications.

The concepts of distributed satellite systems including formation flying applied to small spacecraft may also extend their application. This requires the fleet of spacecraft to determine their absolute and relative position and attitude, along with exchanging various type of data between each other.

To design a complex system, it requires significant amount of modelling and simulation in order to verify concepts of operation and resulting performance. Within the current ONION project, the concept of satellite formation flying is deeply investigated. To support the requirement formulation and to predict the real operation of a spacecraft, modelling methods of various subsystems are researched. In the paper, the requirements and structure of nanosatellite fleet simulation model will be presented.

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