

Master Thesis

Impact of collision avoidance manoeuvres on large satellite constellations

Space travel is currently in a phase of commercialisation. This also includes large satellite constellations, which are to be launched over the next 10 years. Generally, their purpose is to provide full internet coverage available everywhere on earth. Examples are OneWeb with approx. 700 satellites and SpaceX Starlink with between 4000 and up to 12000 satellites, all of which are to be launched into the low Earth orbit. This number of satellites presents completely new challenges for the execution and planning of manoeuvres, especially those with relatively short warning times, such as collision avoidance manoeuvres. The aim of this work is to investigate the influence of manoeuvres on the constellation. Points that are to be worked on are included:

- Research on the basics of satellite constellations,
- Selection of the parameters on which the influence should be considered (e.g. communication between the satellites, provision of the service etc.),
- Design and implementation of a constellation simulator (comprehensive building blocks can be used),
- Optimization of different manoeuvre strategies with regard to the parameters to be investigated,
- Investigation of approaches to the automation of manoeuvre planning and execution,
- Documentation of the work.

OKAPI:Orbits is a Spin-off Start-Up at the Institute of Space Systems of the TU Braunschweig, Germany. Our focus is to provide the NewSpace market with software for the safe operation of satellites in Earth orbits in a simple way. More information about us can be found at www.okapiorbits.space.

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