Multiple Spacecraft Formation Design and Control

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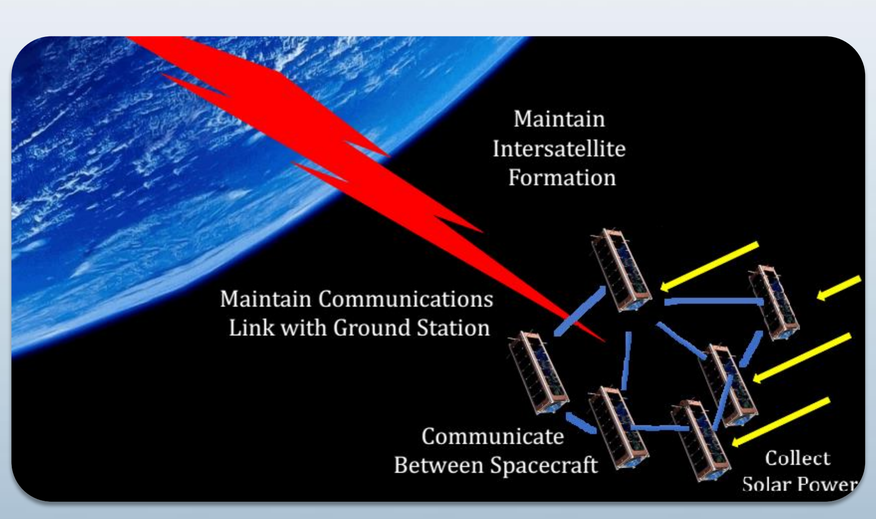
Multi-spacecraft formation, micro- or nano-satellite cluster and fractionated spacecraft are emerging technologies for future space missions. Such technologies involve large number of spacecraft in close proximity. Therefore, maintaining formation could be complicated. This project intends to develop a guidance and control architecture for multi-spacecraft formations addressing fault tolerant capability, accuracy, learning mechanism and dynamic team formation ability.

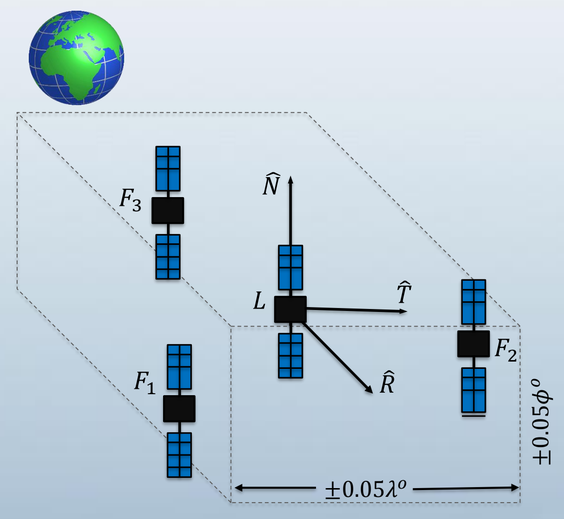
Formation flying with three or more spacecraft provides a great scope for research. A distributed control and guidance architecture will be designed that will support concurrent control to maintain accurate multi-spacecraft formation. This architecture will also address the fault tolerant capability in terms of partial or complete failure by replacing the faulty spacecraft. Concurrent learning mechanism will implemented to enhance multi-spacecraft performance in terms of task allocation and task completion.

Optimal and robust reconfiguration techniques will be deigned for formation deployment and resizing with minimum use of propellant and without any collision risk.

Closely associated to formation flying is the colocation of a fleet of geostationary satellites in an operational window. The objective is to develop an autonomous station keeping algorithm that minimizes the propellant consumption for satellites with low-thrust electric propulsion and on-board navigation and orbit determination capability.

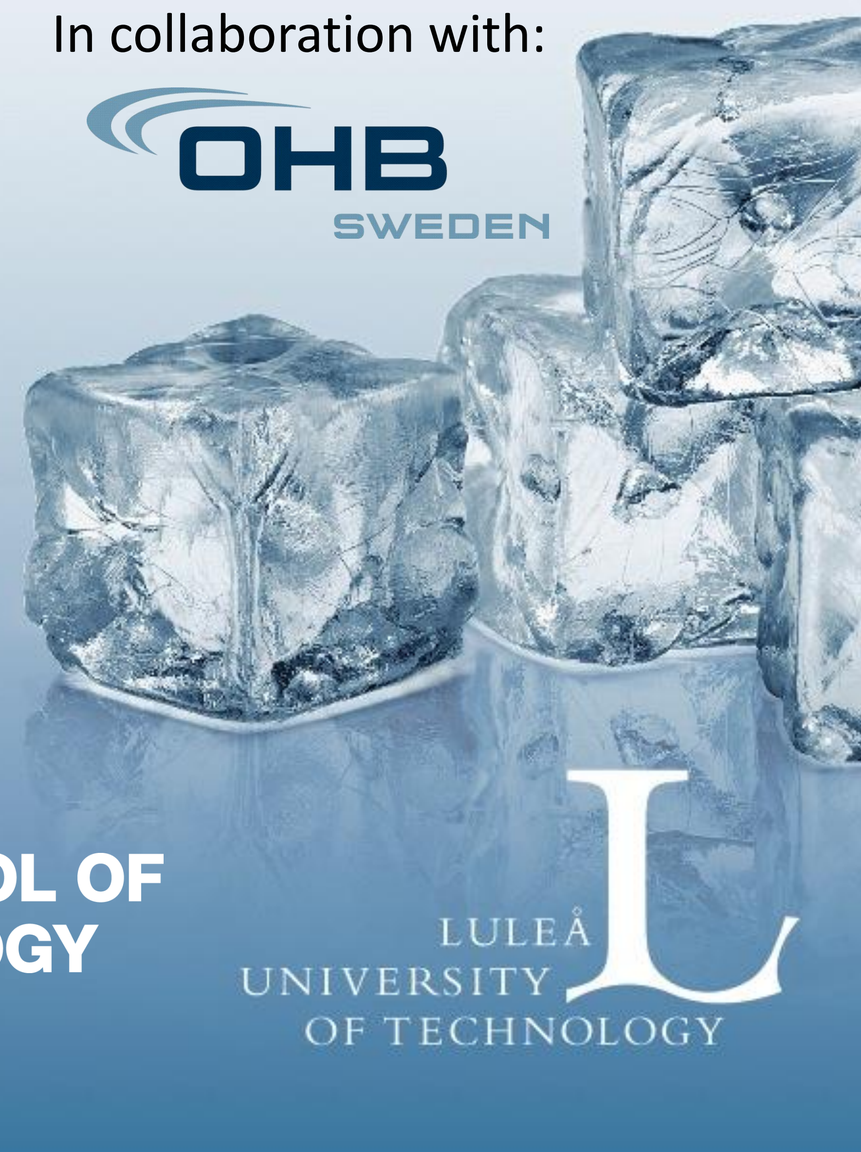


Formation flying scenario



Co-location scenario

In collaboration with:



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