Constellations of Cubesats

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Abstract

Relatively small spacecraft can and have been used as sacrificial probes, with notable examples being the *Galileo* probe and the *Huygens* probe. Constellations of relatively small spacecraft have been realized as the Time History of Events and Macroscale Interactions during Substorms (THEMIS) and Magnetospheric Multiscale (MMS) missions. Cubesats offer the possibility of taking these concepts to qualitiatively new levels by being able to have a much larger number of spacecraft at affordable costs. Constellations of cubesats could be employed either as sacrificial sensor webs or as stand-alone missions, with potential applications to Planetary Science, Heliophysics, and Astrophysics. We survey a suite of concepts for such cubesat constellations and describe technology development being undertaken at the Jet Propulsion Laboratory to enable such constellations. Clear challenges already identified include minimizing propulsion requirements while obtaining the desired trajectories or position knowledge and telecommunications sub-system capabilities versus desired data rates.

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