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FEASIBILITY STUDY OF AN ULTRA-LOW ALTITUDE HYPERSPECTRAL MICRO-SATELLITE

Abstract

Advancement in technologies has enabled high resolution imagery from remote sensing microsatellites (d^o 100 kg); however at high altitude they still suffer from limited imaging capabilities. This study seeks to assess the feasibility of operating a micro-satellite utilising a hyperspectral payload at an Ultra-Low Earth orbit (<250 km). The approach taken has been to design an aerodynamically efficient platform able to provide full Earth coverage and survive in a high drag environment using constant electric ion propulsion. Unlike at higher orbits, drag cannot be neglected and the aerodynamic flow has been simulated using computational molecular flow modelling methods. The ability of micro-satellites to provide Earth coverage has been investigated using an orbit modelling tool (STK). The findings of this study indicate that resolution performances can improve up to 72% by decreasing altitude. The results suggest that this satellite concept is feasible, but it does however come at some costs such as the increased revisit times, increased data rates and a reduced lifetime.