

A Transport Network for In-Orbit Recycling Exploiting Natural Dynamics

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Abstract

This work proposes an initial step towards the construction of a transport network connecting different orbit regimes with a Geosynchronous orbit in the Laplace plane and the Geosynchronous orbit with the Moon. This transport network will be designed to exploit a combination of natural dynamics and impulsive manoeuvres. The methodology proposed starts from the identification of regions, in orbital parameter space, around the Earth, where third-body effects concur to modify favourably the orbital elements. A sequence of manoeuvres is then devised to exploit these natural effects and achieve the desired final orbit. Conversely, the cislunar region will be connected thanks to impulsive manoeuvres and invariant manifolds, peculiar to the Circular Restricted Three-Body Problem. Finally, a perturbed two-body model is also used to identify possible disposal orbits for the decommissioned modular space assets.