

LUNAR CONSTELLATIONS OPTIMIZATION CONSIDERING THE POTENTIAL AND PERTURBATIONS DUE TO THE EARTH AND SUN

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Abstract. In this paper, a technique to design optimized satellite constellations whose mission is to cover the polar region of the Moon with defined time requirements is developed and implemented. The first part is to identify orbits (altitudes, inclinations and eccentricities) and perform a study of the stability of these orbits and the constellation stationkeeping, in particular due to disruptive effects. Among the disturbing forces considered are resonances due to the proximity of the Earth and the presence of the Sun (Lidov-Kozai) and lunar gravitational potential that is highly non-uniform. In the next phase different optimization techniques are adapted to the problem of constellations and compared (in particular genetic algorithms are used). The optimization aims to minimize the costs of a complete mission (design and maintenance) to ensure tasks such as navigation, remote sensing or data collection using the least possible amount of operational satellites.