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2nd International Conference and Exhibition on

Satellite & Space Missions

July 21-23, 2016   Berlin, Germany

Surfaces of invariant relative polar orbits' conditions

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This research describes the mean orbit elements method, to finding the initial conditions that minimize the drift resulting from perturbation on invariant relative orbits. Working with the Hamiltonian model of the relative motion including the perturbation effects of the asphericity of the Earth (*J2, J3* and *J4* perturbation), the secular drift of the longitude of the ascending node and the sum of the argument of perigee and mean anomaly are set equal between all neighboring orbits. By having all orbits drift at equal angular rates on the average, they will not separate over time due to the influence of the second order geo-potential perturbation. The expressions for the second order conditions that guarantee the drift rates of two, or more, neighboring orbits are equal on the average are derived. In this work, an atlas of graphs for the polar invariant relative orbits conditions was introduced. These conditions have been modeled as surfaces in 3D, using Mathematica program, for the Earth's zonal harmonics. The surfaces appeared the all possibilities of choosing the mean elements of leader orbit and differences in momenta elements between leader and followers orbits.

Biography

Shaheera A Altalhi has completed her MSc degree in Astronomy and Space Science from King Abdulaziz University in June 2015. This paper is her first paper and she preferred to participate in the conference before publishing. Her thesis is about Invariant Relative orbits taking into account the influence of J2 perturbation by using Kamel perturbation technique.

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Notes:

J Aeronaut Aerospace Eng
ISSN: 2168-9792 JAAE, an open access journal

Satellite 2016
July 21-23, 2016

Volume 5, Issue 2(Suppl)

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