

Key Technologies (7)
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Author: Mr. Deepak Gaur
Amity School of Engineering, India, deepakgaur@aerospace@gmail.com

NUMERIC COMPARISON AND ORBITAL ELEMENTS VARIATION DRIVEN ORBITAL SIMULATION

Abstract

In the presented research, perturbations in the mean orbital motion (n) and Keplerian or orbital elements ($a, e, i, \omega, \Omega, M$), to a satellite orbiting in Lower Earth Orbit (LEO) within Earth gravitational field are derived as a function of mean orbital elements and time. The assumption is made that the true anomaly approximation is in terms of harmonics of the mean anomaly (M). Also, Earth's gravitational field is assumed to be symmetric and the 2nd harmonic (J_2) is included in calculations. Further, in presence of J_2 , equations are then used in propagating a hypothetical satellite orbit, and eventually, its results are compared to the ones obtained from numerical simulation under the same conditions. The results include short period and secular perturbations of the 1st order and the 2nd order of eccentricity (e). Research extensions can be carried out by including higher order harmonics (J_3, J_4), atmospheric drag and 3rd body influence.