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Cause Effect Nonlinear Relations in Continuous Orbital Transfers under Superposed Pitch and Yaw Deviations

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Abstract: The thrust direction deviations effects in orbital transfers maneuvers cause linear and angular misalignments that displace the vehicle with respect to its nominal directions. Corrections maneuvers are realized, but these deviations are increasing during the vehicle life time due to the propulsion system consuming. The main of the corrections maneuvers are not reached during this period. The vehicle is lost due to the dissipatives forces and the thrusters systems deviations. The understanding of these deviations effects through the final orbit is very important to the mission control under pitch and yaw deviations. In this paper, we show the algebraic relations between these deviations and the keplerian elements of the vehicle final orbit. This analysis allowed to found the theoretical and exact nonlinear cause effect relation between the media values of the keplerian elements (final semi-major axis) and the superposed burn-direction deviations. The dissipatives forces effects were not considered with respect to these thrust deviations during the transfers maneuvers.

Keywords: *Pitch; yaw; thrust deviations; superposed; nonlinear relation.*

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