Cambridge University Press 978-1-108-47236-4 — Applied Nonsingular Astrodynamics Jean Albert Kéchichian Index <u>More Information</u>

Index

acceleration and Earth oblateness, 281-303 and eccentric longitude, 304-326 and epoch eccentric longitude, 202-224 and epoch mean longitude, 154-178 higher-order harmonics in low-thrust orbit transfer, 328-357 in terms of the eccentric longitude, 180-200, 319-326 in terms of the equinoctial elements, 261-265 and thrust, 269-274 acceleration (continuous constant), in six-element formulation, 83-87, 100 acceleration (lunar gravity perturbation), in Euler-Hill frame, 370-374 acceleration (solar gravity perturbation), in Euler-Hill frame, 362-370 acceleration (zonal harmonics perturbation), and Euler-Lagrange equations, 330-332 adjoint differential equations for direct transfer trajectory, 204-213 for equinoctial elements, 429-431 in terms of eccentric longitude, 306-318 arrival location in six-element formulation, 88-92 augmented state in fundamental classic analysis, 27 - 31averaging technique and continuous constant acceleration orbit transfer. 92-100 and costate differential equations for the thrust-constrained case, 10-13 fundamental classic analysis, 3-4 and orbit transfer, 92-100 and SECKSPOT, 40 **B** matrix and partial derivatives, 237-242 and partial derivatives for true longitude, 255-259 Battin, R. H., 329 Betts, J. T., 227, 328 Broucke, R. A., 41, 50, 237, 304, 328

canonical transformations in epoch mean longitude formulation, 162–168 Cefola, P. J., 41, 50, 237, 304, 328

de Pontécoulant's lunar theory, 374–377 departure location, 88–92

Earth oblateness and acceleration, 281-303 equinoctial orbit elements, 260-279 in fundamental classic analysis, 25-27 low-thrust orbit transfer, 282-294 Edelbaum, T. N., 1, 2, 40, 45, 50, 100, 138, 304, 328 electrons and total flux, 36 epoch eccentric longitude formulation, 202-220 epoch mean longitude formulation, 185 equations of motion, 8-9 equinoctial orbit elements and Earth oblateness, 260-279 in Euler-Hill frame, 362-370 multipliers system and simulations for luni-solar gravity, 410-423 nonsingular, 243-255 optimal low-thrust rendezvous, 102-125 and partial derivatives in epoch eccentric longitude formulation, 220-224 in polar coordinates for trajectory optimization, 227-237 and SECKSPOT, 40-41 in six-element formulation, 66-83 summary of mechanics, 4-7 in terms of the eccentric longitude, 184-185 with variable bounded thrust, 140-143 Euler-Hill derivatives lunar gravity perturbations, 370-374 solar gravity perturbations, 362-370 Euler-Lagrange differential equations multipliers system and simulations for luni-solar gravity, 392-399 in optimal low-thrust rendezvous, 106-109 for the seven state variables, 120-122 in six-element formulation, 81-83 and thrust 271-274

Bryson, A. E., 305

CAMBRIDGE

Cambridge University Press 978-1-108-47236-4 — Applied Nonsingular Astrodynamics Jean Albert Kéchichian Index <u>More Information</u>

459

for trajectory optimization based on epoch eccentric longitude formulation, 210-213 with variable bounded thrust, 140 and zonal harmonics perturbation acceleration, 330-332 Feistel, B. S., 329 flux model and minimum-time transfer from LEO to GEO. 35-39 and SECKSPOT, 27-31 fundamental classic analysis and averaging technique, 3-4 and averaging technique and costate differential equations for thrust-constrained case, 10-13 and Earth oblateness, 25-27 and flux model for SECKSPOT, 27-31 low-thrust orbit transfer, 1-3 minimum-time transfers from LEO to GEO, 35 - 39and SECKSPOT thrust, panel orientation angles, and spacecraft body, 31-35 in zero roll and zero pitch and free yaw, 16-25 in zero roll and zero pitch and maximization of solar panel power output, 13-16 GEO (geostationary Earth orbit) with continuous constant acceleration, 83 equinoctial orbit elements in polar coordinates, 236-237 minimum-time transfers from LEO, 35-39 with optimized departure and arrival locations, 90-92 and thrust, 274-279 using averaging technique, 96-100 gravity (luni-solar) and dynamic system for trajectory optimization, 361-385 higher-order expansions in rotating frame, 424-446 higher-order expansions in rotating frame numerics, 446-457 multipliers system and simulations, 391-410 Hallman, W., 377 Hamiltonian in the epoch mean longitude formulation, 160 - 162multipliers system and simulations for luni-solar gravity, 392-399 in terms of the eccentric longitude, 185-188 for trajectory optimization based on epoch eccentric longitude formulation, 209-210 and true longitude for trajectory optimization, 247 - 254harmonics (higher order) and eccentric longitude, 332-345

in low-thrust orbit transfer, 328-357 within true longitude formulation, 345-352 higher order in low-thrust orbit transfer and luni-solar gravity, 377-385 and rotating frame, 358-359, 424-446 Ho, Y.-C., 305 Lagrange multipliers, 41, 250-254 LEO (low Earth orbit) with continuous constant acceleration, 83 equinoctial orbit elements in polar coordinates, 236-237 minimum-time transfers to GEO, 35-39 with optimized departure and arrival locations, 90-92 and thrust, 274-279 using averaging technique, 96-100 longitude formulation eccentric, 180-192, 304-326, 332-345 epoch eccentric, 202-220 epoch mean, 154-174 and higher-order harmonics, 345-352 as sixth state variable, 283-284 low-thrust orbit transfer acceleration, 328-357 and Earth oblateness, 282-294 and Edelbaum, 51-59 fundamental classic analysis, 1-3 and higher-order harmonics, 319-326 higher order in, 358-359, 377-385, 424-446 minimum-fuel time-fixed rendezvous, 113-122 using eccentric longitude formulation, 180-192 and variable bounded thrust, 135-153 low-thrust power-limited vehicles, in SECKSPOT, 44-46 low-thrust rendezvous boundary conditions for, 168-173 and equinoctial orbit elements, 102-125 minimum fuel time-fixed, 113-122 in near-circular orbit, 145-153 using epoch mean longitude formulation, 154-174 lunar gravity perturbations in Euler-Hill frame, 370-374 partial derivatives of, 401-404 lunar theory (de Pontécoulant's), 374-377 Marec, J.-P., 305 minimum-time transfer around the oblate Earth, 265-269 in the epoch mean longitude formulation, 168-173 from fixed initial state with continuous constant acceleration, 83-87 in optimal low-thrust rendezvous, 106-109 with optimized departure and arrival locations, 88-92

CAMBRIDGE

460

Cambridge University Press 978-1-108-47236-4 — Applied Nonsingular Astrodynamics Jean Albert Kéchichian Index <u>More Information</u>

Index

transversality condition for, 213–220	and higher-order expansion of luni-solar gravity,
in the epoch mean longitude formulation, 155–160	and higher-order harmonics inertial accelerations, 358–359
equations of, 8–9 nonzero partial derivatives, 311–318 nonzero partial derivatives of 174–178, 192–197	multipliers system and simulations for luni-solar gravity, 391–410
partial derivatives of, 126–133, 197–200,	SECKSPOT
220–224	capabilities and limitations, 39–49
six-state differential equations of, 103-106	flux model for, 27–31
in terms of the eccentric longitude, 181-188	minimum-time transfers from LEO to GEO, 35–39
nominal attitude, 2	thrust angle and panel orientation angle and
nonsingular orbital elements, 243-255	spacecraft body, 31–35 second zonal perturbation effect and Earth
oblateness (Earth)	oblateness, 282–294
in fundamental classic analysis, 25–27	seven state variables dynamic equations, 117-122
minimum-time transfer and, 281–303	six-element formulation
in trajectory optimization in equinoctial	algorithm, 64-65
coordinates, 260–279	and Edelbaum low-thrust orbit transfer problem,
optimal control theory, 59-64	51–59
orbit transfer	and optimal control theory, 59-64
with continuous constant acceleration, 83-100	and orbit transfer with continuous constant
and higher-order expansion of luni-solar gravity,	acceleration, 83–100
431-446	and true longitude for trajectory optimization,
minimum-time with oblateness, 281–303	244-250
gravity, 404–410	66–83
using averaging technique, 92–100	solar gravity perturbations
orbital mechanics (nonsingular equinoctial	in Euler–Hill frame, 362–370
elements), 66–83	partial derivatives of, 399–401
	solar panel power
panel orientation angle in SECKSPOT, 31–35 partial derivatives	35–39
B matrix, 237–242, 255–259	in zero roll and pitch, 13–16
equinoctial orbit elements, 220–224 lunar gravity perturbations, 401–404	system differential equations, 204–213, 429–431
motion, 126–133 multipliers system and simulations for luni-solar	three sides of the spacecraft body (SECKSPOT), 31–35
gravity, 410–423	thrust angle (SECKSPOT), 31-35
nonzero partials, 174-178, 192-197	thrust magnitude
solar gravity perturbations, 399-401	optimization, 136–145
polar coordinates and trajectory optimization	in SECKSPOT, 44-46
mechanics, 227–237	thrust orientation
protons and total flux, 36	acceleration, 269–274
	and averaged state, 10–13
rendezvous (low-thrust)	in terms of nonsingular equinoctial orbit
boundary conditions for, 168–173	elements, 68
and equinoctial orbit elements, 102–125	variable bounded, 135–153
minimum-fuel time-fixed, 113–122	and zero roll and zero pitch, 13–16
in near-circular orbit, 145–153	trajectory optimization
using epoch mean longitude formulation,	202_220
1J+-1/4 rotating frame	and dynamic system of luni-solar gravity
dynamic system for luni-solar gravity	nerturbations 361_385
aynamic system for rum-solar gravity	in Earth ablatances 200, 270

Cambridge University Press 978-1-108-47236-4 – Applied Nonsingular Astrodynamics Jean Albert Kéchichian Index More Information

and higher-order expansion of luni-solar gravity, 424-446	yaw, 16–25
in terms of eccentric longitude, 304-326	zero pitch
using eccentric longitude formulation, 180-192	in the epoch mean longitude formulation,
using nonsingular orbital elements and true	168–173
longitude, 243–255	and maximization of solar panel power, 13-16
using nonsingular variational equations in polar	for trajectory optimization based on epoch
coordinates, 227-237	eccentric longitude formulation, 213-220
ue longitude	and zero roll constraint, 16-25
B matrix, 255–259	zero roll
and higher-order harmonics, 345-352	in the epoch mean longitude formulation,
in trajectory optimization, 243-255	168–173
	and free pitch and yaw, 16–25
elocity, 76–81	and maximization of solar panel power, 13-16
-	for trajectory optimization based on epoch
Valker, M. J. H., 328	eccentric longitude formulation, 213-220

using eccentric longitude formulation, using nonsingular orbital elements and longitude, 243-255 using nonsingular variational equations coordinates, 227-237 true longitude B matrix, 255–259 and higher-order harmonics, 345-352 in trajectory optimization, 243-255 velocity, 76-81

Walker, M. J. H., 328

461

Index