Tables for the Jupiter–Europa and Saturn–Enceladus systems

Abstract. Tables for some periodic orbits in the Jupiter-Europa system and the Saturn-Enceladus system. These tables supplement the paper "Symplectic geometry and space mission design, On the Jupiter–Europa and Saturn–Enceladus systems".

1. Tables

In this appendix, we give tables with the data associated to the various families we have considered.

Table 1. Data for g-$LPO1$ branch for JE.

Γ	$x(0)$	$\dot{y}(0)$	T	(C/B)-sign & Floquet multipliers	μ^p_{CZ} / μ^s_{CZ} / μ_{CZ}
3.01142113	1.0226290	0.10284894	0.13999	$(+/-)$ $\varphi_p = 0.137$, $(+/-)$ $\varphi_s = 0.142$	3 / 3 / 6
3.00383366	1.00797270	0.05073828	1.17402	$(+/-)$ $\varphi_p = 0.332$, $(+/-)$ $\varphi_s = 1.290$	3 / 3 / 6
3.00372747	1.00538715	0.07480305	1.33771	$(+/-)$ $\varphi_p = 0.556$, $(+/-)$ $\varphi_s = 1.572$	3 / 3 / 6
3.00365597	1.00378076	0.09779235	1.59835	$(+/-)$ $\varphi_p = 1.068$, $(+/-)$ $\varphi_s = 2.089$	3 / 3 / 6
3.00360358	1.00244635	0.12945606	2.08332	$(+/-)$ $\varphi_p = 1.845$, $(+/-)$ $\varphi_s = 3.136$	3 / 3 / 6
3.00360326	1.00243628	0.12977936	2.08832	$(+/-)$ $\varphi_p = 1.858$, $(+/+)$ $\lambda_s = -1.03$	3 / 3 / 6
3.00360049	1.00234732	0.13271728	2.13332	$(+/-)$ $\varphi_p = 1.987$, $(+/+)$ $\lambda_s = -1.05$	3 / 3 / 6
3.00359960	1.00231829	0.13370950	2.14831	$(+/-)$ $\varphi_p = 2.037$, $(-/+)$ $\varphi_s = 3.166$	3 / 3 / 6
3.00358255	1.00180287	0.15481646	2.43323	$(+/+)$ $\lambda_p = -4.39$, $(-/+)$ $\varphi_s = 3.796$	3 / 3 / 6
3.00343430	1.00043030	0.32769866	3.13136	$(+/+)$ $\lambda_p = -129$, $(-/+)$ $\varphi_s = 5.223$	3 / 3 / 6

Table 2. Data for DPO branch for JE.

Γ	$x(0)$	$\dot{y}(0)$	T	(C/B)-sign & Floquet multipliers	μ^p_{CZ} / μ^s_{CZ} / μ_{CZ}
3.00374605	1.00900895	0.04460670	1.25362	$(-/-)$ $\lambda_p = 1.29$, $(+/-)$ $\varphi_s = 1.385$	2 / 3 / 5
3.00358658	1.00884026	0.04739922	1.41448	$(-/-)$ $\lambda_p = 2.23$, $(+/-)$ $\varphi_s = 1.565$	2 / 3 / 5
3.00356924	1.00889026	0.04727261	1.43426	$(-/-)$ $\lambda_p = 2.36$, $(+/-)$ $\varphi_s = 1.589$	2 / 3 / 5
3.00340053	1.00928559	0.04673515	1.64653	$(-/-)$ $\lambda_p = 4.29$, $(+/-)$ $\varphi_s = 1.829$	2 / 3 / 5
3.00323697	1.00958786	0.04684116	1.88433	$(-/-)$ $\lambda_p = 8.52$, $(+/-)$ $\varphi_s = 2.094$	2 / 3 / 5
3.00257321	1.00913170	0.05562606	2.88768	$(-/-)$ $\lambda_p = 136$, $(+/-)$ $\varphi_s = 3.092$	2 / 3 / 5
3.00237147	1.00863170	0.05990199	3.16288	$(-/-)$ $\lambda_p = 246$, $(-/+)$ $\varphi_s = 3.334$	2 / 3 / 5
3.00109352	1.00470170	0.09778837	5.12979	$(-/-)$ $\lambda_p = 2485$, $(-/+)$ $\varphi_s = 6.161$	2 / 3 / 5
3.00109192	1.00469670	0.09785369	5.13303	$(-/-)$ $\lambda_p = 2570$, $(+/+)$ $\lambda_s = 1.027$	2 / 4 / 6
3.00107109	1.00463170	0.09871030	5.17546	$(-/-)$ $\lambda_p = 3062$, $(+/+)$ $\lambda_s = 1.540$	2 / 4 / 6

TABLE 3. Data for $LPO2$ branch for JE.

Γ	$x(0)$	$\dot{y}(0)$	T	(C/B)-sign & Floquet multipliers	μ^p_{CZ} / μ^s_{CZ} / μ_{CZ}
3.00374885	1.00955895	0.04118756	1.25694	$(+/-)$ $\varphi_p = 0.190$, $(+/-)$ $\varphi_s = 1.397$	3 / 3 / 6
3.00371150	1.01150895	0.03105844	1.34143	$(+/-)$ $\varphi_p = 0.538$, $(+/-)$ $\varphi_s = 1.555$	3 / 3 / 6
3.00369790	1.01200895	0.02882949	1.37591	$(+/-)$ $\varphi_p = 0.625$, $(+/-)$ $\varphi_s = 1.620$	3 / 3 / 6
3.00363027	1.01440084	0.01977091	1.62295	$(+/-)$ $\varphi_p = 1.101$, $(+/-)$ $\varphi_s = 2.094$	3 / 3 / 6
3.00357414	1.016776	0.0130372	2.1215	$(+/-)$ $\varphi_p = 1.878$, $(+/-)$ $\varphi_s = 3.131$	3 / 3 / 6
3.00357388	1.016787	0.013014	2.12519	$(+/-)$ $\varphi_p = 1.885$, $(+/+)$ $\lambda_s = -1.02$	3 / 3 / 6
3.00356878	1.01701395	0.01253366	2.20708	$(+/-)$ $\varphi_p = 2.120$, $(-/+)$ $\varphi_s = 3.225$	3 / 3 / 6
3.00353952	1.01771395	0.01187914	2.65553	$(+/+)$ $\lambda_p = -9.64$, $(-/+)$ $\varphi_s = 4.144$	3 / 3 / 6
3.00349789	1.01765259	0.01364657	2.95454	$(+/+)$ $\lambda_p = -36.3$, $(-/+)$ $\varphi_s = 4.743$	3 / 3 / 6

TABLE 4. Data for DRO branch for JE.

Γ	$x(0)$	$\dot{y}(0)$	T	(C/B)-sign & Floquet multipliers	μ^p_{CZ} / μ^s_{CZ} / μ_{CZ}
3.00429783	0.99502455	0.07670173	0.40998	$(-/+)$ $\varphi_p = 5.862$, $(-/+)$ $\varphi_s = 5.894$	1 / 1 / 2
3.00156431	0.99037034	0.06224607	1.02778	$(-/+)$ $\varphi_p = 5.245$, $(-/+)$ $\varphi_s = 5.406$	1 / 1 / 2
3.00101739	0.98833167	0.06026263	1.32856	$(-/+)$ $\varphi_p = 4.973$, $(-/+)$ $\varphi_s = 5.216$	1 / 1 / 2
3.00060753	0.98623049	0.05949811	1.64998	$(-/+)$ $\varphi_p = 4.712$, $(-/+)$ $\varphi_s = 5.050$	1 / 1 / 2
3.00054882	0.98587513	0.05946574	1.7052	$(-/+)$ $\varphi_p = 4.670$, $(-/+)$ $\varphi_s = 5.026$	1 / 1 / 2
2.99962388	0.97762100	0.06369886	3	$(-/+)$ $\varphi_p = 4.001$, $(-/+)$ $\varphi_s = 4.787$	1 / 1 / 2
2.99935885	0.97409965	0.06735824	3.5	$(-/+)$ $\varphi_p = 3.987$, $(-/+)$ $\varphi_s = 4.863$	1 / 1 / 2
2.99908502	0.97038828	0.07212000	4	$(-/+)$ $\varphi_p = 3.995$, $(-/+)$ $\varphi_s = 5.001$	1 / 1 / 2
2.99868251	0.96488658	0.08024713	4.6003	$(-/+)$ $\varphi_p = 4.185$, $(-/+)$ $\varphi_s = 5.254$	1 / 1 / 2

TABLE 5. Data for one branch bifurcation from 3rd cover of the $LPO2$-orbit for JE. These spatial orbits are simply-symmetric w.r.t. the xz-plane and ends at collision. Its symmetric family is obtained by using the reflection at the xy-plane.

Γ	$x(0)$	$z(0)$	$\dot{y}(0)$	T	(C/B)-sign & Floquet multipliers	μ_{CZ}
3.00363027	1.01440084	0	0.01974709	4.86	$(-/+)$ $\varphi_p^3 = 3.305$, $\varphi_s^3 = 0$	$14 \to 16$
3.00362881	1.01439256	0.00046114	0.01976648	4.87	$(-/+)$ $\varphi_1 = 3.300$, $(-/+)$ $\varphi_2 = 6.281$	14
3.00359018	1.01415816	0.00242577	0.02031752	4.90	$(-/+)$ $\varphi_1 = 3.208$, $(-/+)$ $\varphi_2 = 6.280$	14
3.00357914	1.01409052	0.00273476	0.02047842	4.91	$(+/+)$ $\lambda = -1.05$, $(-/+)$ $\varphi = 6.278$	14
3.00354287	1.01386628	0.003555363	0.02101794	4.94	$(+/+)$ $\lambda = -1.18$, $(-/+)$ $\varphi = 6.255$	14
3.00325974	1.01198527	0.00688259	0.02594794	5.2	$(+/+)$ $\lambda = -1.62$, $(-/+)$ $\varphi = 5.963$	14
3.00298774	1.00985792	0.00824897	0.03258269	5.5	$(+/-)$ $\varphi_1 = 2.566$, $(-/+)$ $\varphi_2 = 5.657$	14
3.00270453	1.00652898	0.00795347	0.04651756	5.85	$(-/+)$ $\varphi_1 = 1.947$, $(-/+)$ $\varphi_2 = 5.978$	14
3.00264234	1.00560524	0.00778449	0.05051319	5.88	$(+/+)$ $\lambda = -1.09$, $(-/+)$ $\varphi = 5.958$	14
3.00263168	1.00544296	0.00774780	0.05124733	5.88	$(-/+)$ $\varphi_1 = 3.488$, $(-/+)$ $\varphi_2 = 5.937$	14
3.00260038	1.00454296	0.00720347	0.05686831	5.86	$(-/+)$ $\varphi_1 = 4.662$, $(-/+)$ $\lambda = 1$	b-d
3.00260927	1.00399399	0.00658371	0.06201856	5.8	$(-/+)$ $\varphi = 4.813$, $(+/+)$ $\lambda = 2.278$	15
3.00266582	1.00306075	0.00521508	0.07465765	5.6	$(-/+)$ $\varphi = 4.443$, $(+/+)$ $\lambda = 3.660$	15
3.00278841	1.00150186	0.00269606	0.11584022	5	$(-/+)$ $\varphi = 3.653$, $(+/+)$ $\lambda = 1.829$	15
3.00279353	1.00129733	0.00238127	0.12512611	4.9	$(-/+)$ $\varphi_1 = 3.540$, $(-/+)$ $\lambda = 1$	b-d
3.00277937	1.00084704	0.00169978	0.15351993	4.66	$(-/+)$ $\varphi_1 = 3.246$, $(-/+)$ $\varphi_2 = 5.702$	14

TABLE 6. Data for one branch bifurcation from $LPO2^3$-orbit for JE, ending at DRO^5. The CZ-index is constant, and gives a bridge between the planar orbits. These spatial orbits are x-axis-symmetric. Its symmetric family is obtained by reflection at the ecliptic.

Γ	$x(0)$	$\dot{y}(0)$	$\dot{z}(0)$	T	(C/B)-sign & Floquet multipliers	μ_{CZ}
3.00363027	1.01440084	0.01974709	0	4.86	$(-/+)$ $\varphi_p^3 = 3.305$, $\varphi_s^3 = 0$	$14 \to 16$
3.00351924	1.01408954	0.01928185	0.01342237	4.96	$(-/-)$ $\lambda_1 = -1.24$, $(-/-)$ $\lambda_2 = 1.09$	15
3.00321170	1.01314307	0.01799332	0.02676988	5.25	$(-/-)$ $\lambda_1 = -1.62$, $(-/-)$ $\lambda_2 = 1.45$	15
3.00302231	1.01246670	0.01723541	0.03300118	5.46	$(+/-)$ $\varphi = 2.749$, $(-/-)$ $\lambda = 1.78$	15
3.00273486	1.01099334	0.01657953	0.04285920	5.82	$(+/-)$ $\varphi = 1.618$, $(-/-)$ $\lambda = 1.55$	15
3.00270684	1.01077857	0.01644568	0.04412031	5.85	$(+/-)$ $\varphi = 1.801$, $(-/-)$ $\lambda = 1.40$	15
3.00266563	1.01548137	0.01548137	0.04575934	5.88	$(+/-)$ $\varphi = 2.506$, $(-/-)$ $\lambda = 1.35$	15
3.00243536	1.01068879	0.00516070	0.04995370	6	$(-/+)$ $\varphi = 5.761$, $(-/-)$ $\lambda = 8.52$	15
3.00204821	1.01119864	−0.01174966	0.05089250	6.24	$(-/+)$ $\varphi = 5.965$, $(-/-)$ $\lambda = 31.1$	15
3.00172312	1.01167768	−0.02457421	0.04793350	6.5	$(-/+)$ $\varphi = 6.016$, $(-/-)$ $\lambda = 30.0$	15
3.00147493	1.01207539	−0.03349482	0.04374826	6.75	$(-/+)$ $\varphi = 6.070$, $(-/-)$ $\lambda = 22.3$	15
3.00127220	1.01242785	−0.04020652	0.03910792	7	$(-/+)$ $\varphi = 6.124$, $(-/-)$ $\lambda = 15.2$	15
3.00096072	1.01304236	−0.04944170	0.02947258	7.5	$(-/+)$ $\varphi = 6.201$, $(-/-)$ $\lambda = 6.16$	15
3.00073221	1.01358551	−0.05528744	0.01932635	8	$(-/+)$ $\varphi = 5.911$, $(-/-)$ $\lambda = 1.14$	15
3.00055690	1.01409401	−0.05914769	0.00388381	8.5	$(-/+)$ $\varphi = 4.550$, $(-/-)$ $\lambda = 1.00$	15
3.00054882	1.01412064	−0.05930512	0	8.52	$(-/+)$ $\varphi_p^5 = 4.500$, $\varphi_s^5 = 0$	$16 \to 14$

TABLE 7. Data for one branch bifurcation from $g\text{-}LPO1^3$ for JE. These spatial orbits are x-axis-symmetric and connected to one branch bifurcation from DPO^3 via b-d. Its symmetric family is obtained by reflection at the ecliptic.

Γ	$x(0)$	$\dot{y}(0)$	$\dot{z}(0)$	T	(C/B)-sign & Floquet multipliers	μ_{CZ}
3.00365597	0.98557900	−0.01951876	0	4.79	$(-/+)$ $\varphi_p^3 = 3.205$, $\varphi_s^3 = 0$	$14 \to 16$
3.00365338	0.98556744	−0.01945341	0.00182488	4.80	$(-/+)$ $\varphi = 3.214$, $(-/-)$ $\lambda = 1.001$	15
3.00363389	0.98561874	−0.01938011	0.00580611	4.82	$(-/-)$ $\lambda_1 = -1.01$, $(-/-)$ $\lambda_2 = 1.005$	15
3.00329911	0.98657072	−0.01815373	0.02416862	5.12	$(-/-)$ $\lambda_1 = -1.54$, $(-/-)$ $\lambda_2 = 1.378$	15
3.00314093	0.98708523	−0.01763006	0.02950246	5.30	$(-/-)$ $\lambda_1 = -1.02$, $(-/-)$ $\lambda_2 = 1.685$	15
3.00300399	0.98759083	−0.01727225	0.03377964	5.46	$(+/-)$ $\varphi = 2.290$, $(-/-)$ $\lambda = 1.977$	15
3.00281046	0.98856773	−0.01745284	0.04009001	5.73	$(+/-)$ $\varphi = 0.976$, $(-/-)$ $\lambda = 2.451$	15
3.00275889	0.98918471	−0.01885469	0.04265726	5.82	$(+/-)$ $\varphi = 0.134$, $(-/-)$ $\lambda = 4.422$	15
						b-d
3.00275823	0.98925887	−0.01917383	0.04284561	5.82	$(-/-)$ $\lambda_1 = 1.041$, $(-/-)$ $\lambda_2 = 5.013$	14
3.00276196	0.98939330	−0.01992825	0.04305515	5.83	$(-/-)$ $\lambda_1 = 1.148$, $(-/-)$ $\lambda_2 = 6.636$	14
3.00296320	0.98997681	−0.03157520	0.03598567	5.75	$(-/-)$ $\lambda_1 = 1.064$, $(-/-)$ $\lambda_2 = 100.2$	14
3.00316033	0.99025736	−0.04249067	0.02045809	5.68	$(-/-)$ $\lambda_1 = 1.011$, $(-/-)$ $\lambda_2 = 400.3$	14
3.00323676	0.99035914	−0.04685850	0.00096495	5.65	$(-/-)$ $\lambda_1 = 1.0001$, $(-/-)$ $\lambda_2 = 619.3$	14
3.00323697	0.99035942	−0.04686768	0	5.65	$\varphi_s^3 = 0$, $(-/-)$ $\lambda = 620.23$	$13 \to 15$

TABLE 8. Data for one branch bifurcation from 3rd cover of the g-$LPO1$-orbit for JE. These spatial orbits are simply-symmetric w.r.t. the xz-plane and they are connected to one branch bifurcation from the 3rd cover of the DPO-orbit via birth-death. Its symmetric family is obtained by using the reflection at the ecliptic.

Γ	$x(0)$	$z(0)$	$\dot{y}(0)$	T	(C/B)-sign & Floquet multipliers	μ_{CZ}
3.00365597	0.98557900	0	−0.01951876	4.79	$(-/+)$ $\varphi_p^3 = 3.205$, $\varphi_s^3 = 0$	$14 \to 16$
3.00365461	0.98556706	−0.00036219	−0.01947401	4.80	$(-/+)$ $\varphi_1 = 3.215$, $(-/+)$ $\varphi_2 = 6.281$	14
3.00363389	0.98568597	−0.00175392	−0.01975974	4.82	$(+/+)$ $\lambda = -1.01$, $(-/+)$ $\varphi = 6.277$	14
3.00360033	0.98588066	−0.00278699	−0.02023321	4.84	$(+/+)$ $\lambda = -1.12$, $(-/+)$ $\varphi = 6.263$	14
3.00331461	0.98766211	−0.00655464	−0.02492170	5.11	$(+/+)$ $\lambda = -1.52$, $(-/+)$ $\varphi = 5.978$	14
3.00314742	0.98883839	−0.00763969	−0.02842198	5.29	$(+/-)$ $\varphi_1 = 3.031$, $(-/+)$ $\varphi_2 = 5.756$	14
3.00289637	0.99094696	−0.00836889	−0.03579903	5.61	$(+/-)$ $\varphi_1 = 1.373$, $(-/+)$ $\varphi_2 = 5.309$	14
3.00285045	0.99142732	−0.00835072	−0.03776509	5.67	$0.376 \pm 0.570i$, $0.806 \pm 1.221i$	14
3.00277633	0.99243798	−0.00805049	−0.04244268	5.78	$0.491 \pm 0.121i$, $1.917 \pm 0.472i$	14
3.00277358	0.99249304	−0.00802039	−0.04284315	5.79	$(+/+)$ $\lambda_1 = 1.987$, $(-/-)$ $\lambda_2 = 2.016$	14
3.00276770	0.993012244	−0.00750257	−0.04644237	5.82	$(+/+)$ $\lambda_1 = 1.000$, $(-/-)$ $\lambda_2 = 7.181$	14
						b-d
3.00277093	0.99302677	0.00744432	−0.04668427	5.82	$(-/+)$ $\varphi = 6.138$, $(-/-)$ $\lambda = 8.013$	13
3.00296373	0.99201168	0.00567451	−0.04755480	5.75	$(-/+)$ $\varphi = 6.233$, $(-/-)$ $\lambda = 100.3$	13
3.00316033	0.99081340	0.00306250	−0.04704925	5.68	$(-/+)$ $\varphi = 6.263$, $(-/-)$ $\lambda = 400.3$	13
3.00323697	0.99035942	0	−0.04686768	5.65	$(-/-)$ $\lambda = 620.23$, $\varphi_s^3 = 0$	$13 \to 15$

TABLE 9. g-$LPO1$ branch for SE.

Γ	$x(0)$	$\dot{y}(0)$	T	(C/B)-sign & Floquet multipliers	μ_{CZ}^p / μ_{CZ}^s / μ_{CZ}
3.00033109	1.00061213	0.01702742	0.22681	$(+/-)$ $\varphi_p = 0.218$, $(+/-)$ $\varphi_s = 0.232$	3 / 3 / 6
3.00015209	1.00157026	0.00982528	1.13552	$(+/-)$ $\varphi_p = 0.421$, $(+/-)$ $\varphi_s = 1.245$	3 / 3 / 6
3.00014609	1.00109981	0.01422219	1.33077	$(+/-)$ $\varphi_p = 0.534$, $(+/-)$ $\varphi_s = 1.549$	3 / 3 / 6
3.00014309	1.00076095	0.01889960	1.60328	$(+/-)$ $\varphi_p = 1.118$, $(+/-)$ $\varphi_s = 2.081$	3 / 3 / 6
3.00014089	1.00047925	0.02552883	2.13798	$(+/-)$ $\varphi_p = 1.962$, $(+/+)$ $\lambda_s = -1.06$	3 / 3 / 6
3.00014069	1.00044659	0.02664172	2.22579	$(+/-)$ $\varphi_p = 2.302$, $(-/+)$ $\varphi_s = 3.324$	3 / 3 / 6
3.00014049	1.00041446	0.02785333	2.31612	$(+/+)$ $\lambda_p = -1.58$, $(-/+)$ $\varphi_s = 3.513$	3 / 3 / 6
3.00013817	1.00020619	0.04126365	2.90065	$(+/+)$ $\lambda_p = -35.5$, $(-/+)$ $\varphi_s = 4.711$	3 / 3 / 6

TABLE 10. DPO branch for SE.

Γ	$x(0)$	$\dot{y}(0)$	T	(C/B)-sign & Floquet multipliers	μ_{CZ}^p / μ_{CZ}^s / μ_{CZ}
3.00014744	0.99838904	−0.00977411	1.23860	$(-/-)$ $\lambda_p = 1.188$, $(+/-)$ $\varphi_s = 1.364$	2 / 3 / 5
3.00014064	0.99826971	−0.00934116	1.41906	$(-/-)$ $\lambda_p = 2.270$, $(+/-)$ $\varphi_s = 1.571$	2 / 3 / 5
3.00012744	0.99811661	−0.00917943	1.88166	$(-/-)$ $\lambda_p = 8.463$, $(+/-)$ $\varphi_s = 2.091$	2 / 3 / 5
3.00011304	0.99809959	−0.00985129	2.46619	$(-/-)$ $\lambda_p = 46.25$, $(+/-)$ $\varphi_s = 2.697$	2 / 3 / 5
3.00010524	0.99815786	−0.01051283	2.76504	$(-/-)$ $\lambda_p = 101.1$, $(+/-)$ $\varphi_s = 2.979$	2 / 3 / 5
3.00008192	0.99846180	−0.01309687	3.59018	$(-/-)$ $\lambda_p = 500.3$, $(+/-)$ $\varphi_s = 3.699$	2 / 3 / 5
3.00006838	0.99867270	−0.01491712	4.08764	$(-/-)$ $\lambda_p = 911.4$, $(+/-)$ $\varphi_s = 4.164$	2 / 3 / 5

TABLE 11. $LPO2$ branch for SE.

Γ	$x(0)$	$\dot{y}(0)$	T	(C/B)-sign & Floquet multipliers	μ^p_{CZ} / μ^s_{CZ} / μ_{CZ}
3.00014639	1.00217453	0.00646333	1.30672	$(+/-)$ $\varphi_p = 0.451$, $(+/-)$ $\varphi_s = 1.499$	3 / 3 / 6
3.00014319	1.00276240	0.00405869	1.57114	$(+/-)$ $\varphi_p = 1.018$, $(+/-)$ $\varphi_s = 2.009$	3 / 3 / 6
3.00014299	1.00279991	0.00393120	1.59627	$(+/-)$ $\varphi_p = 1.060$, $(+/-)$ $\varphi_s = 2.059$	3 / 3 / 6
3.00014075	1.00328757	0.00253817	2.11312	$(+/-)$ $\varphi_p = 1.881$, $(+/+)$ $\lambda_s = -1.03$	3 / 3 / 6
3.00014061	1.00331899	0.00247078	2.17031	$(+/-)$ $\varphi_p = 2.043$, $(-/+)$ $\varphi_s = 3.142$	3 / 3 / 6
3.00014030	1.00338269	0.00235356	2.31077	$(+/+)$ $\lambda_p = -1.22$, $(-/+)$ $\varphi_s = 3.484$	3 / 3 / 6
3.00013613	1.00339866	0.00308260	3.07749	$(+/+)$ $\lambda_p = -69.2$, $(-/+)$ $\varphi_s = 5.041$	3 / 3 / 6

TABLE 12. DRO branch for SE.

Γ	$x(0)$	$\dot{y}(0)$	T	(C/B)-sign & Floquet multipliers	μ^p_{CZ} / μ^s_{CZ} / μ_{CZ}
3.00010525	1.00137692	−0.01325298	0.67023	$(-/+)$ $\varphi_p = 5.595$, $(-/+)$ $\varphi_s = 5.673$	1 / 1 / 2
3.00004405	1.00224224	−0.01182054	1.29643	$(-/+)$ $\varphi_p = 5.001$, $(-/+)$ $\varphi_s = 5.234$	1 / 1 / 2
3.00002425	1.00276541	−0.01163206	1.70339	$(-/+)$ $\varphi_p = 4.671$, $(-/+)$ $\varphi_s = 5.027$	1 / 1 / 2
2.99999205	1.00419386	−0.01226462	2.84090	$(-/+)$ $\varphi_p = 4.060$, $(-/+)$ $\varphi_s = 4.785$	1 / 1 / 2
2.99996645	1.00592895	−0.01421020	4.06771	$(-/+)$ $\varphi_p = 4.007$, $(-/+)$ $\varphi_s = 5.025$	1 / 1 / 2
2.99995365	1.00682933	−0.01550883	4.56302	$(-/+)$ $\varphi_p = 4.172$, $(-/+)$ $\varphi_s = 5.236$	1 / 1 / 2
2.99986545	1.01156940	−0.02377257	5.79878	$(-/+)$ $\varphi_p = 5.114$, $(-/+)$ $\varphi_s = 5.951$	1 / 1 / 2

TABLE 13. Purple 14 for SE. These spatial orbits are simply-symmetric w.r.t. the xz-plane and ends at collision. Its symmetric family is obtained by using the reflection at the xy-plane.

Γ	$x(0)$	$z(0)$	$\dot{y}(0)$	T	(C/B)-sign & Floquet multipliers	μ_{CZ}
3.00014299	1.00279991	0	0.00393120	4.78	$(-/+)$ $\varphi^3_p = 3.182$, $\varphi^3_s = 0$	$14 \to 16$
3.00014260	1.00281790	0.00019127	0.00386379	4.84	$(-/+)$ $\varphi_1 = 3.259$, $(-/+)$ $\varphi_2 = 6.282$	14
3.00014129	1.00277804	0.00047538	0.00395858	4.87	$(+/+)$ $\lambda = 3.208$, $(-/+)$ $\varphi = 6.280$	14
3.00012209	1.00211470	0.00153818	0.00578987	5.36	$(+/-)$ $\varphi_1 = 3.111$, $(-/+)$ $\varphi_2 = 5.740$	14
3.00010829	1.00137563	0.00156298	0.00875806	5.82	$(-/+)$ $\varphi_1 = 0.776$, $(-/+)$ $\varphi_2 = 5.669$	14
3.00010291	1.00087722	0.00139401	0.01128814	5.86	$(+/-)$ $\varphi_1 = 4.665$, $(-/+)$ $\varphi_2 = 6.126$	14
						b-d
3.00010295	1.00083899	0.00135458	0.01162196	5.84	$(-/+)$ $\varphi = 4.783$, $(+/+)$ $\lambda = 1.517$	15
3.00010612	1.00055789	0.00095022	0.01542803	5.53	$(-/+)$ $\varphi = 4.334$, $(+/+)$ $\lambda = 3.712$	15
3.00011036	1.00024558	0.00044664	0.02518603	4.86	$(-/+)$ $\varphi = 3.504$, $(+/+)$ $\lambda = 1.109$	15
						b-d
3.00011031	1.00021998	0.00040764	0.02663091	4.80	$(-/+)$ $\varphi_1 = 3.424$, $(-/+)$ $\varphi_2 = 5.916$	14
3.00010281	1.00003238	0.00010169	0.05878312	4.17	$(-/+)$ $\varphi_1 = 3.781$, $(-/+)$ $\varphi_2 = 5.884$	14
3.00010021	1.00001491	0.00006054	0.07739259	4.08	$(-/+)$ $\varphi_1 = 3.965$, $(-/+)$ $\varphi_2 = 6.041$	14

TABLE 14. Red 15 for SE. The CZ-index is constant, and gives a bridge between the planar orbits. These spatial orbits are x-axis-symmetric. Its symmetric family is obtained by reflection at the ecliptic.

Γ	$x(0)$	$\dot{y}(0)$	$\dot{z}(0)$	T	(C/B)-sign & Floquet multipliers	μ_{CZ}
3.00014299	1.00279991	0.00393120	0	4.78	$(-/+)$ $\varphi_p^3 = 3.182$, $\varphi_s^3 = 0$	$14 \to 16$
3.00013559	1.00272159	0.00369764	0.00343416	5.00	$(-/-)$ $\lambda_1 = -1.39$, $(-/-)$ $\lambda_2 = 1.13$	15
3.00012559	1.00256280	0.00349797	0.00541943	5.26	$(-/-)$ $\lambda_1 = -1.53$, $(-/-)$ $\lambda_2 = 1.52$	15
3.00012139	1.00248791	0.00342004	0.00611889	5.38	$(+/-)$ $\varphi = 2.928$, $(-/-)$ $\lambda = 1.73$	15
3.00011759	1.00241319	0.00335832	0.00672992	5.50	$(+/-)$ $\varphi = 2.395$, $(-/-)$ $\lambda = 1.90$	15
3.00010399	1.00204385	0.00282460	0.00925842	5.90	$(-/+)$ $\varphi = 3.184$, $(-/-)$ $\lambda = 1.41$	15
3.00009759	1.00208424	0.00127533	0.00976558	5.98	$(-/+)$ $\varphi = 5.692$, $(-/-)$ $\lambda = 6.55$	15
3.00009417	1.00210781	0.00047162	0.00992209	6.03	$(-/+)$ $\varphi = 5.846$, $(-/-)$ $\lambda = 13.5$	15
3.00009145	1.00212691	−0.00015208	0.00999912	6.07	$(-/+)$ $\varphi = 5.888$, $(-/-)$ $\lambda = 18.8$	15
3.00007425	1.00225503	−0.00382600	0.00970041	6.38	$(-/+)$ $\varphi = 5.974$, $(-/-)$ $\lambda = 32.3$	15
3.00005185	1.00244477	−0.00788343	0.00765368	7.00	$(-/+)$ $\varphi = 6.092$, $(-/-)$ $\lambda = 15.2$	15
3.00004205	1.00254154	−0.00938862	0.00615688	7.40	$(-/+)$ $\varphi = 6.171$, $(-/-)$ $\lambda = 7.51$	15
3.00003105	1.00266948	−0.01085595	0.00374582	8.01	$(-/+)$ $\varphi = 5.829$, $(-/-)$ $\lambda = 1.08$	15
3.00002425	1.00276636	−0.01162574	0.00034005	8.51	$(-/+)$ $\varphi = 4.510$, $(-/-)$ $\lambda = 1.05$	15
3.00002405	1.00277176	−0.01163165	0	8.54	$(-/+)$ $\varphi_p^5 = 4.489$, $\varphi_s^5 = 0$	$16 \to 14$

TABLE 15. Blue 15 and Blue 14 for SE. These spatial orbits are x-axis-symmetric and connected to one branch bifurcation from DPO^3 via b-d. Its symmetric family is obtained by reflection at the ecliptic.

Γ	$x(0)$	$\dot{y}(0)$	$\dot{z}(0)$	T	(C/B)-sign & Floquet multipliers	μ_{CZ}
3.00014309	0.99718487	−0.00386895	0	4.80	$(-/+)$ $\varphi_p^3 = 3.217$, $\varphi_s^3 = 0$	$14 \to 16$
3.00014289	0.99717670	−0.00383214	0.00048106	4.83	$(-/+)$ $\varphi = 3.246$, $(-/-)$ $\lambda = 1.016$	15
3.00014169	0.99719319	−0.00380810	0.00145833	4.85	$(-/-)$ $\lambda_1 = -1.04$, $(-/-)$ $\lambda_2 = 1.027$	15
3.00013425	0.99730021	−0.00365996	0.00377737	5.02	$(-/-)$ $\lambda_1 = -1.45$, $(-/-)$ $\lambda_2 = 1.183$	15
3.00012251	0.99749232	−0.00343875	0.00594605	5.34	$(-/-)$ $\lambda_1 = -1.03$, $(-/-)$ $\lambda_2 = 1.700$	15
3.00012093	0.99752153	−0.00341248	0.00620193	5.39	$(+/-)$ $\varphi = 2.758$, $(-/-)$ $\lambda = 1.782$	15
3.00011193	0.99772535	−0.00333595	0.00766874	5.69	$(+/-)$ $\varphi = 0.976$, $(-/-)$ $\lambda = 2.451$	15
3.00010800	0.99793026	−0.00365343	0.00862538	5.84	$(+/-)$ $\varphi = 0.092$, $(-/-)$ $\lambda = 2.549$	15
						b-d
3.00010820	0.99796166	−0.00381731	0.00868408	5.84	$(-/-)$ $\lambda_1 = 1.196$, $(-/-)$ $\lambda_2 = 3.812$	14
3.00010958	0.99799080	−0.00423992	0.00854277	5.83	$(-/-)$ $\lambda_1 = 1.171$, $(-/-)$ $\lambda_2 = 10.02$	14
3.00012042	0.99807079	−0.00718764	0.00594564	5.71	$(-/-)$ $\lambda_1 = 1.068$, $(-/-)$ $\lambda_2 = 203.9$	14
3.00012568	0.99810519	−0.00868716	0.00307711	5.66	$(-/-)$ $\lambda_1 = 1.011$, $(-/-)$ $\lambda_2 = 485.0$	14
3.00012738	0.99811615	−0.00918031	0	5.65	$\varphi_s^3 = 0$, $(-/-)$ $\lambda_p = 620.1$	$13 \to 15$

TABLE 16. Green 14 and Green 13 for SE. These spatial orbits are simply-symmetric w.r.t. the xz-plane and they are connected to one branch bifurcation from the 3rd cover of the DPO-orbit via b-d. Its symmetric family is obtained by using the reflection at the ecliptic.

Γ	$x(0)$	$z(0)$	$\dot{y}(0)$	T	(C/B)-sign & Floquet multipliers	μ_{CZ}
3.00014306	0.99718487	0	−0.00386895	4.80	$(-/+)$ $\varphi_p^3 = 3.217$, $\varphi_s^3 = 0$	$14 \to 16$
3.00014210	0.99720294	0.00036902	−0.00390227	4.84	$(-/+)$ $\varphi_1 = 3.197$, $(-/+)$ $\varphi_2 = 6.282$	14
3.00014182	0.99721138	0.00041974	−0.00392247	4.85	$(+/+)$ $\lambda = -1.01$, $(-/+)$ $\varphi = 6.281$	14
3.00013324	0.99748294	0.00114054	−0.00461090	5.05	$(+/+)$ $\lambda = -1.48$, $(-/+)$ $\varphi = 6.089$	14
3.00012084	0.99793674	0.00156551	−0.00595530	5.39	$(+/-)$ $\varphi_1 = 2.704$, $(-/+)$ $\varphi_2 = 5.684$	14
3.00011446	0.99822206	0.00164295	−0.00696832	5.60	$(+/-)$ $\varphi_1 = 1.776$, $(-/+)$ $\varphi_2 = 5.499$	14
3.00011146	0.99838620	0.00163494	−0.00763914	5.71	$0.458 \pm 0.723i$, $0.624 \pm 0.986i$	14
3.00010841	0.99863569	0.00153928	−0.00887793	5.82	$0.595 \pm 0.212i$, $1.489 \pm 0.530i$	14
3.00010824	0.99866658	0.00151731	−0.00906541	5.83	$(+/+)$ $\lambda_1 = 1.448$, $(-/-)$ $\lambda_2 = 1.786$	14
3.00010818	0.99869599	0.00149114	−0.00926286	5.84	$(+/+)$ $\lambda_1 = 1.034$, $(-/-)$ $\lambda_2 = 2.566$	14
						b-d
3.00010852	0.99871851	0.00144710	−0.00949590	5.84	$(-/+)$ $\varphi = 6.109$, $(-/-)$ $\lambda = 4.479$	13
3.00010970	0.99869031	0.00139716	−0.00954957	5.83	$(-/+)$ $\varphi = 6.135$, $(-/-)$ $\lambda = 10.065$	13
3.00011700	0.99844373	0.00110062	−0.00936425	5.75	$(-/+)$ $\varphi = 6.253$, $(-/-)$ $\lambda = 102.96$	13
3.00012680	0.99813343	0.00026518	−0.00918878	5.65	$(-/+)$ $\varphi = 6.280$, $(-/-)$ $\lambda = 572.25$	13
3.00012738	0.99811615	0	−0.00918031	5.65	$\varphi_s^3 = 0$, $(-/-)$ $\lambda_p = 620.1$	$13 \to 15$