

Contents

1	Introduction	1
1.1	Historical survey	1
1.1.1	The three–body problem	2
1.1.2	Effect of solar radiation pressure	4
1.1.3	Effect of oblateness	6
1.2	Potential due to oblate spheroid	7
1.3	The mean motion	8
1.4	Equations of motion with perturbation due to solar radiation and oblateness	10
1.5	Poincaré maps	13
1.6	Lagrangian points	18
1.7	Layout of the Thesis	19
2	Evolution of Periodic Orbits in the Sun–Saturn System	25
2.1	Introduction	25
2.2	Computational technique	26
2.2.1	Sun centered periodic orbits	31
2.2.2	Saturn centered periodic orbits	41
2.3	Conclusion	56

3 Evolution of the <i>f</i> Family Orbits in the Photo–Gravitational Sun–Saturn System with Oblateness	58
3.1 Introduction	58
3.2 Computational technique	59
3.3 Conclusion	80
4 Analysis of Effect of Oblateness of Smaller Primary on the Evolution of Periodic Orbits	81
4.1 Introduction	82
4.2 Results and discussion	83
4.3 Prediction of orbit through regression analysis	96
4.4 Conclusion	109
5 Analysis of Effect of Solar Radiation Pressure of Bigger Primary on the Evolution of Periodic Orbits	111
5.1 Introduction	112
5.2 Results and discussion	113
5.3 Conclusion	140
6 The Perturbed Photo–Gravitational Restricted Three–Body Problem: Analysis of Resonant Periodic Orbits	142
6.1 Introduction	142
6.2 Estimation of resonant ratio	145
6.3 Exterior first order resonance	146
6.4 Interior first order resonance	151
6.5 Interior resonance of third order	159
6.6 Interior resonance of fifth order	165
6.7 Conclusion	172

7 On Higher Order Resonant Periodic Orbits in the Photo–Gravitational Restricted Three–Body Problem	174
7.1 Introduction	174
7.1.1 Overview on resonance	175
7.2 Model description	177
7.3 Interior seventh order resonance	178
7.4 Interior ninth order resonance	182
7.5 Interior eleventh order resonance	183
7.6 Effect of perturbing forces on physical and geometric parameters of higher order resonant orbits	185
7.7 Conclusion	190
Appendix-A	191
Publications	198
Bibliography	199