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Autore	Fitzpatrick Richard <1963->
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 4.3 Motion in a nearly circular orbit  
 4.4 Perihelion precession of planets; 4.5 Perihelion precession of Mercury; Exercises; 5: Rotating reference frames; 5.1 Introduction; 5.2 Rotating reference frames; 5.3 Centrifugal acceleration; 5.4 Coriolis force; 5.5 Rotational flattening; 5.6 Tidal elongation; 5.7 Tidal torques; 5.8 Roche radius; Exercises; 6 Lagrangian mechanics; 6.1 Introduction; 6.2 Generalized coordinates; 6.3 Generalized forces; 6.4 Lagrange's equation; 6.5 Generalized momenta; Exercises; 7: Rigid body rotation; 7.1 Introduction; 7.2 Fundamental equations  
 7.3 Moment of inertia tensor  
 7.4 Rotational kinetic energy; 7.5 Principal axes of rotation; 7.6 Euler's equations; 7.7 Euler angles; 7.8 Free precession of the Earth; 7.9 MacCullagh's formula; 7.10 Forced precession and nutation of the Earth; 7.11 Spin-orbit coupling; 7.12 Cassini's laws; Exercises; 8: Three-body problem; 8.1 Introduction; 8.2 Circular restricted three-body problem; 8.3 Jacobi integral; 8.4 Tisserand criterion; 8.5 Co-rotating frame; 8.6 Lagrange points; 8.7 Zero-velocity surfaces; 8.8 Stability of Lagrange points; Exercises; 9: Secular perturbation theory; 9.1 Introduction  
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 9.3 Secular evolution of planetary orbits; 9.4 Secular evolution of asteroid orbits; 9.5 Secular evolution of artificial satellite orbits; Exercises; 10: Lunar motion; 10.1 Introduction; 10.2 Preliminary analysis; 10.3 Lunar equations of motion; 10.4 Unperturbed lunar motion; 10.5 Perturbed lunar motion; 10.6 Description of lunar motion; Exercises; Appendix A: Useful mathematics; A.1 Calculus; A.2 Series expansions; A.3 Trigonometric identities; A.4 Vector identities; A.5 Conservative fields; A.6 Rotational coordinate transformations  
 A.7 Precession

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## Sommario/riassunto

This accessible text on classical celestial mechanics, the principles governing the motions of bodies in the Solar System, provides a clear and concise treatment of virtually all of the major features of solar system dynamics. Building on advanced topics in classical mechanics such as rigid body rotation, Lagrangian mechanics and orbital perturbation theory, this text has been written for advanced undergraduates and beginning graduate students in astronomy, physics, mathematics and related fields. Specific topics covered include Keplerian orbits, the perihelion precession of the planets, tidal interactions between the Earth, Moon and Sun, the Roche radius, the stability of Lagrange points in the three-body problem and lunar motion. More than 100 exercises allow students to gauge their understanding and a solutions manual is available to instructors. Suitable for a first course in celestial mechanics, this text is the ideal bridge to higher level treatments.

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